THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

FINAL REPORT

Prepared by C.A. Hooker

for the

Social Sciences and Humanities Research Council

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Conseil de recherches en sciences humaines du Canada

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Foreword

The Social Sciences and Humanities Research Council is pleased to present these summaries and papers as a final report on the series of regional and national workshops on the topic of the Human Context for Science and Technology that took place in 1980.

The views expressed in the papers are those of the authors; distribution by the Council does not imply endorsement. We welcome them, however, as a valued contribution to our ongoing discussions of research topics for the Strategic Grants program.

André Fortier

President

March 1982

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C.A. Hooker

Acknowledgements

The activities culminating in this report have stretched out over the whole of 1980. They have included organizing regional HCST groups, holding two group meetings in each region, a meeting in Montreal and the 1980 national programme meeting to draft the proposals contained herein.

Throughout this process, Mr. Terry Burrell, of Victor and Burrell Research and Consulting, has played a key organizational role. (See also my acknowledgement of his role in the Stage 1 process, at the outset of the Preliminary Report.[1]) He held the organization together on a week-to-week basis and, at my suggestion, he attended most of the regional meetings and the Montreal meeting, providing important and effective personal contact and coordination. This too has allowed me to remain less directive and to play an equally needed role of a more facilitating and adjudicating kind that might otherwise not have been possible to the same extent.

Before the 1980 national programme meeting, Terry played a valuable role in helping to focus the agenda issues and, after the meeting, stayed behind with me to to assist in structuring this final report. Later, he took charge of the process of initial circulation of the draft report for comment, the mapping out of suggested revisions and of seeing the final product printed and distributed on time. (Since, as in 1979, there were only 21 days from conference end to delivery of the report, Terry's long nights and weekends of work were particularly appreciated.)

Terry and I have been ably assisted in all the functions described in the preceeding paragraph by Mr. Ted Schrecker, who earlier had assisted in focusing issues emerging from the first round of group meetings (and earlier still, assisted in the editing of the stage 1 report). An effective organizer, indefatigable, Ted has given generously of his time, knowledge, contacts and enthusiasm to the project.

Particular acknowledgement belongs to Mrs. Bev Hughes of the Department of Philosophy, University of Western Ontario. Bev acted as secretary to the national process, arranging printing and distribution, and the logistics of the 1980 national conferences, and simultaneouly acted as secretary for the Ontario regional group -- all the while, having full secretarial responsibility for a major new programme in post-graduate biomedical ethics at the University of Western Ontario. Her calm cheerfulness and effective organization avoided untold hazards, fostering a smoothly coordinated operation.

My special admiration for the three regional coordinators, Professors Barry Hoffmaster, Jack MacCormack and Frank Tester, who gave so unstintingly of their time and energy to create effective regional groups. Their sense of dedication and depth of preparation comes through the quality of the regional reports. Their breadth of vision is reflected in the wide range of people involved in the regional meetings. What cannot so easily be publicly reflected are the long hours of thought, personal contact and administrative organization that lay behind

the effective operation of the groups.

In all these activities, Alan Fox, Council's representative for the exercise, has provided unfailing encouragement, attended meetings, helped to focus issues and generally provided effective support for the process above and beyond the strict duty of a funding officer, for which we are all very appreciative.

And now last, but by no means least: to everyone who selflessly contributed by coming to meetings and/or providing written responses, my thanks; together you have managed to create an impressive body of thought and an impressive demonstration of common concern which will, I believe, long outlive this exercise.

NOTE: This version of the report was jointly prepared for second printing by Cliff Hooker, Ted Schrecker and Terry Burrell.

I. INTRODUCTION

Our relationship, as a civilization, with science and technology is at an historically critical point for a number of reasons. First, the scale, scope, complexity and gravity of our decisions -- and of their consequences -- is unprecedented, thanks to science and technology. Second, the development of science and technology themselves is now bound up with the massive investment of social resources as never before; this is true even of efforts to understand and manage science and technology, and to mitigate the difficulties they have created. Third, the theoretical tools accompanying the new pervasiveness of science and technology (e.g., systems theory, decision theory and their many sub-disciplines) have themselves played major role in the attempt to understand, manage and direct the course of science and technology.

The material prosperity of industrialized societies has been fundamentally based on scientific and technological advance. But, scientific and technological development has now come to have an ambivalent character. Some wonder: will superscience create the conditions for a 1984 or an Armageddon? This question expresses, in dramatic form, a concern about science and technology increasingly abroad in the community. It also presupposes ideals of a truly humane life which motivate people to query and criticize the ever-expanding roles of science and technology in shaping our lives.

The concerns of the Canadian community take myriad specific forms. Why

have man-induced cancers become a major cause of death when medical science has supposedly advanced so far? Are nuclear reactors acceptably safe? What does this mean and who decides? What will happen to the hundreds of thousands of people whose jobs may be threatened by the microelectronics revolution? to the Dene, and other native peoples, under the impact of technological development? How much are privacy and political freedom threatened by databanks, electronic surveillance, and the like?

Concerns such as these have led to a new and uniquely intense focus on science and technology as intellectual structures, and upon the human activities which go to make them up, to direct them and to appropriate their products.

These concerns and interests, which provide the setting for the development of studies in the human context of science and technology (hereafter HCST) account for the wide variety of interests, backgrounds and expertise represented in the deliberations of those involved in the consultation exercise which preceded the preparation of this report. This diversity is essential to the strength and legitimacy of the area of study. Yet, within this diversity there is a remarkable unanimity of concern and purpose.

This setting also accounts for the present report's emphasis on a balanced package of proposals for funding the HCST area. Only in this way can the real needs of the Canadian community be served.

Finally, the nature of the area and the desirability of integrating research activities which address the foregoing concerns dictated the choice of the process which led up to the present report, a process initiated by Council which we now briefly describe.

18 Months of Evaluation

The Social Sciences and Humanities Research Council decided to initiate a series of major programmes of "strategic research grants" in areas of importance to the Canadian community. In mid-1979, the area of "Science Technology and Human Values" was one of a number selected for further exploration. C.A. Hooker was asked to coordinate an initial evalution, and commissioned some 20 background papers covering a broad spectrum of concerns. After these were circulated to a further group of people for comment, an initial national conference was held in November, 1979. That process resulted in a three-volume report to Council, The Human Context for Science and Technology. Council subsequently published an edited version of that 1979 report under the same title[2]; demand has been sufficient to justify a second printing of the document.

In response to that report, Council decided to support a second stage of exploration, designed to increase substantially the number of people participating in the process, and to focus on the design of a practicable programme of support over the following years.

With these goals and the nature of the area in mind, and observing budgetary constraints, it seemed most effective to base activities on regionally organized groups. Accordingly, regional coordinators were selected to choose a representative regional executive and to organize two regional meetings to discuss the HCST area and to focus upon requirements for a programme of HCST inquiry, involving as many concerned people of all affiliations (for example, university, private enterprise, union, government, citizens' groups) as was possible. In addition, an emphasis was placed on obtaining a representative mix from the academic community (a balance between and among the humanities and social sciences, as well as representation from the sciences).

Three groups were formed -- in the Atlantic provinces, in Ontario, and in the Western provinces. Despite vigorous attempts, no Quebec regional group could be formed at the time. Some people from Quebec have been involved in the process -- in the first national meeting, the Ontario regional group meeting, the Montreal meeting and the 1980 national programme meeting. However, given that no Quebec regional group was formed, Quebec has been underrepresented in the process. This is to be deeply regretted, not least because there are several groups of people in Quebec with substantial research interests in the HCST area.

Each of the three regional groups that were formed had two meetings. The first was aimed at further delineating the HCST area and identifying concrete research topics of interest. The second meeting was focused much more on what a strategic grants programme in the HCST area should

strive to accomplish, and what specific form such a programme should take.

At the invitation of Council, a further group of people who did not feel comfortable within the regional structure and who wished to pursue specific theoretical issues, met in Montreal in October, 1980.

The final regional meetings and the Montreal meeting selected delegates to attend a national meeting held at St. Mary's, Ontario on October 31 to November 2, 1980 (hereafter: the 1980 national programme meeting). This meeting had the task of making final recommendations to Council on a programme of strategic grants in the HCST area which represented the views and perceived needs of its supporting community. The report that follows articulates those recommendations.

The significance of the exercise which culminated in the present report should be stressed: more than 300 people from across Canada, both within and outside the academic community, have been involved in the process to varying degrees. In the process, an identifiable community of researchers working in the HCST area has emerged. Additionally, the process has generated a significant body of written work, only a small part of which is directly embodied in Volume I of this report. Volume II comprises reports of the regional and Montreal groups, and Volume III comprises background materials prepared for these groups' meetings; Volumes II and III are under separate cover. The earlier document, The Human Context for Science and Technology, has already been mentioned.

II. THE HCST AREA: CONCERNS AND CHALLENGES

The 1979 report concluded that the HCST area was perhaps best defined by the concerns which participants shared and which drew them together in the common purpose of relating science and technology to the "human context". Some of those concerns have already been voiced at the beginning of this report. This section outlines them in slightly greater depth; a more detailed description, drawn from the 1979 report, is appended as Annex I.

Science and technology dominate and saturate our society -- our decisions, values, ways of life; our hopes and fears for the future; even our ways of thinking about the future. It is, therefore, natural and prudent to want to understand in a systematic fashion, the social setting for the development of science and technology. It is also natural and prudent, in developing a greater comprehension of the complex relationship between society and science and technology, to strive to provide a framework for taking greater control of scientific and technological development and their social impact. Among these concerns, the 1979 report identified:

Concern to provide a descriptive history of the social institutionalization of science and its observable impacts on the practice of science and technology.

Concern to relate the practice of science and technology to the "national interest": where should it be heading? What should be supported, and how should it be best supported?

Concern to establish the moral and social limits (if any) to

scientific investigation and technological development and to explore societally-based structuring of research and development priorities (e.g., favouring nuclear versus solar energy or vice-versa).

Concern to relate the societal support of science and technology to the support of individual and group development: science for whom in our present society? For whom ideally? How to make more equitable the access to science and technology?

As the impact of science and technology and of their appropriation becomes more profound and more universal, it is less often viewed as unambiguously good. "Progress" has both positive and negative connotations. Illustrations of current concerns in this area, cited in the 1979 report, include:

Concern with the overall nature of technology or technique, its general psychological and cultural impacts as well as its economic and biophysical impacts.

Concern with the radically new kinds of decisions being thrust on us by science and technology, e.g., managing potential radiation damage over millenia; cloning and personal identity; impacts of hydrocarbon consumption on the global climate.

Concern for the future of natural ecosystems and the biological stability of the plant generally; relatedly, broad concerns with the physical and social "limits" to Western industrial development patterns.

Concern with the impact of technological development, with "future shock" and "information overload".

This kind of concern appears to be widely felt in the Canadian community. It is expressed in the restructuring of government bureaucracies (e.g., the creation of Departments of the Environment, of a Ministry of State for Science and Technology, of processes and institutions for assessing environmental impacts) and, as a corollary, in the proliferation of consulting firms advising private industry and government on

environmental and social impacts. Further expressions: the growth of related research activities in universities; the formation of union task forces on automation and on the impact of microelectronics; the growth of strong and persistent citizen organizations with these concerns. This far-from-exhaustive list illustrates that HCST is not merely an esoteric academic research interest.

If HCST is to be taken seriously as an area of inquiry, its pursuit will frequently require approaches different from those which have characterized much scholarly inquiry in the past.

First, it will often demand an integrated approach transcending disciplinary and institutional boundaries. Such an approach can involve an interdisciplinary effort within the academic community, and can require, as well, effective collaboration between academic researchers and members of constituencies outside the academic community, be they civil servants, trade unions, or citizen organizations.

Second, the pursuit of serious inquiry in HCST will involve a fundamental reintegration of human values into the inquiry process. This can take place in a number of ways: for instance, in reaffirming the legitimacy and unique importance of the humanities in examining issues raised by the development of science and technology. An awareness is required, too, of the way in which emphasis on a paradigm of "research" modelled after the natural sciences has served as a significant -- but all-too-often unacknowledged -- limitation on the range of perspectives considered

relevant to examining our society. Participants in the national meeting, in recognizing this issue, expressed a strong preference for the term "inquiry" rather than "research". The former term has been used in this report wherever possible.

The pursuit of HCST concerns can involve inquiry directed at a number of areas, such as:

General methodological study of the relationships between science and technology and between their development and socio-political conditions, cultural ideas, and so on.

Critical examination of those values and policies which currently shape (and are shaped by) our approach to scientific and technological development.

Studies of scientific and technological development and the role of social conditions, institutional structures and public policy in limiting and directing that process.

Examination of the appropriateness of technologies to socio-economic settings, and of the choices made in developing appropriate technologies.

Development of workable and justifiable paradigms for risk assessment, for impact assessment of technological developments, etc.

Development of theories of the shaping of societal values and cultural ideas by technological transformations.

Examination and critical evaluation of governmental use of scientific and social-scientific data.

These again, are but illustrative examples of the kind of inquiry which will serve to illuminate the concerns listed earlier.

Both within and beyond these areas of inquiry, numerous issues will be raised by specific scientific and technological developments. At the

1979 meeting, six themes emerged as useful ways of grouping or clustering substantive and methodological concerns in the HCST field.

(1) The importance of providing fundamental, evaluative critiques of the practice of technological development and implementation.

(2) The importance of studying the domain of science and technology as human activities, especially as strategic and social activities, in a way which involves developing both normative and empirical theoretical frameworks and brings them into contact with one another.

(3) The need to evolve a deeper understanding of how science and technology enter the broader social context to produce changes in that context -- and, conversely, of how that context shapes the development of science and technology.

(4) The impact of specific public policies on science and technology, and the impact of scientifically- and technologically-generated or mediated information on public policy. Relatedly, the (normative and empirically-observable) limits to public control of research and to what information should be/is made available to whom and for what purpose.

(5) The need for research into and the development of alternative research institutions, (e.g., "storefront research" organizations), and for the support of new research alliances and decision-making processes in science-and technology-related issue areas.

(6) The need to develop "proactive" rather than reactive assessments -- that is, assessments that will attempt to shape the course of future scientific and technological development in such a way as to preempt problems, rather than merely mitigating the negative effects of scientific and technological decisions already made.

Such a brief summary cannot do justice to the richness and importance of the HCST field; readers are urged to refer to the working document on The Human Context for Science and Technology, itself by no means an exhaustive or comprehensive examination of the field.

Support for a programme of HCST inquiry has been growing steadily for some years among academics in various fields. Many individual Canadian

researchers, and a few teams, are engaged in various relevant projects: for instance, in work on the history and sociology of scientific knowledge and of technological development; in the analysis of science policy and the dynamics of scientific institutions; in biomedical ethics; in the theory and practice of technology assessment; and so on.

This support has not been restricted to, nor has it even primarily emanated from, the academic community. This is shown by the expansion of governmental interest in the HCST area; by the rapid growth and increasing sophistication of citizens' groups in the HCST area; and by increasingly articulate and explicit questionings of conventionally uncritical attitudes toward science and technology among the general public.

These concerns and responses are not unique to Canada; we share them with the rest of the industrialized world. In every country, however, they have their special form. In Canada, for example, Mr. Justice Berger's inquiry into the impact of northern pipelines represented pioneering work in a situation unique to the Canadian context, both in expression of a range of normally-unrepresented concerns and in exploring approaches to assess and articulate those concerns.

Existing Canadian research activity in the HCST area is valuable, and provides a framework and foundation for HCST activity in the future. From the point of view of HCST concerns as elaborated in the course of the present exercise, however, it has four related deficiencies.

1. It is <u>insufficient</u>. There simply is not nearly enough work being done in the HCST field. The magnitude of resources devoted to inquiry in the field does not begin to compare with the billions of dollars spent annually on scientific research and technological development. Available funds and institutional resources for HCST-related inquiry remain thoroughly inadequate to deal with the breadth and complexity of the "problematique" which must be addressed.

2. It is <u>uneven</u>. Many serious, or potentially serious, problems have received inadequate attention, (for instance, the criteria for judging the acceptability of risks posed by interactive effects of chemicals in food, water and air; the role of new technologies in magnifying existing problems). In other cases, the investigation of a problem has been too restricted, either in the social scope of its impact considered, or in the methodological framework used to examine it, (e.g., processes for making cost-benefit or risk-benefit trade-offs among energy or communications technologies).

3. It is <u>narrow</u>. Much work is dominated by specialists in various areas who have not placed their research in the context of wider concerns. Those workings on impacts of specific technologies often do not communicate with those working on management tools like quality of life indicators, let alone with those concerned with the integration of values into scientific decisions. Inquiry is often methodologically inappropriate or self-limiting, as well: for instance, failing to acknowledge that humanities perspectives have the same validity as "hard research" findings; adopting a restricted, disciplinary scope when an interdisciplinary perspective is required; failing to communicate with the public affected by the technology in question.

4. It is <u>socially incomplete</u> and unrepresentative. Many groups and constituencies, (e.g., women; industrial workers; those whose jobs may be eliminated by the spread of microelectronics), have legitimate and pressing concerns which should be integrated into the process of inquiry and decision-making. Yet all too often, they are excluded from access to the resources needed, and from opportunities to articulate their perspective and develop their own analysis of the issues.

None of these criticisms should be taken either as ignoring or as belittling the body of existing academic literature, originating both in Canada and elsewhere, which is relevant to the HCST area. They (a) acknowledge its limitations, and (b) reinforce the argument that inquiry

of the kind envisaged into HCST should not consist simply of "more of the same". Rather, it should aim at correcting these four deficiencies. Inquiry should have integrated relevant human value dimensions in such a way that they connect meaningfully with the science/technology dimensions. Thus, HCST inquiry should be aimed at improving basic understanding of the HCST area and/or be aimed at the mitigation of significant science/technology related problems.

It follows too that HCST inquiry should embody a methodological self-consciousness. Chosen methods or approaches should respect the motivating concerns of the HCST area, avoid the limitations of existing research paradigms, and acknowledge the fundamental influence of methodology or approach on the range of possible conclusions.

In keeping with this new research sensibility, we should expect, (1) willingness to break through disciplinary boundaries where they would otherwise fragment a sound approach; (2) determination to consider and respect the needs of relevant constituencies; and (3) acknowledgement of the need to consult with, involve, and report results to those affected constituencies.

It will be difficult to develop research/inquiry of this quality and multi-dimensionality. Developing the HCST area poses real challenges to the Canadian research community, and to Canadian society as a whole. High quality research cannot reasonably be expected to develop overnight; we suffer both from a lack of consciousness of the problems involved and

from a lack of experience with appropriate paradigms of inquiry. Fortunately, there exists in Canada a strong commitment to address both these obstacles, a commitment forcefully expressed in the involvement of over 300 people in this 18-month exercise. And in many particular areas of concern there are individuals with experience of successful and rewarding approaches. Examples of such approaches are invaluable, and should be widely disseminated. Individuals capable of organizing and carrying out many more such endeavours should obviously be supported. But beyond that, there is a major job to be done in "consciousness - raising", in interdisciplinary team formation, in effective problem identification and in effective communication with the various affected constituencies -- all with the objective of improving the quality, range and quantity of inquiry in the HCST field over the next few years.

There is no question that a programme of this sort involves risks. Some inquiry experiments may not bear fruit. Some struggles to form interdisciplinary teams may not succeed. Against this possibility that some individual projects will prove unrewarding must be weighed the undeniable overall rewards from a programme of funding in the HCST area. Accompanying the many and generalized benefits of scientific progress and technological development have been significant costs. Were a programme of strategic grants in HCST area to lead to a better understanding which would serve to mitigate even a few future costs and/or encourage some scientific and technological development in a direction more consciously aimed at meeting human needs, the expenditure of funds on such a programme would be more than justified.

By providing funding for the HCST area, Council will be putting itself at the cutting edge of Canadian history, in helping to crystallize a new stage of development in Canadian scholarly inquiry and in helping Canadian society come to grips with questions which are crucial to its future.

III. SUBSTANTIVE PROGRAMME PROPOSALS

III.1 Introduction: The Requirements for Effective Inquiry

In order to ensure that high quality work develops in the HCST are, work which satisfies the concerns expressed in the preceding section, a number of specific requirements will have to be met.

First, Council will have to ensure that high quality inquiry proposals in the area are indeed funded; that is, it will be necessary that the strategic grants programme explicitly designates the forms of inquiry appropriate for HCST work as eligible for funding under the programme. The innovative character of many of these may make it difficult for them to receive support under current funding procedures and requirements.

Second, it will be important to devote significant resources to enhancing the capability of Canadian researchers to undertake inquiry which embodies the qualities discussed towards the end of Section II.

Third, there is a need to improve communications among those engaged in HCST inquiry. There is also an immediate need to improve communication between this network of scholars, members of other constituencies with interests in the area, and constituencies at large which are affeced by the problems which science and technology generate.

A fourth requirement, which will help to ensure that the first three are met, is the involvement of the non-academic community. In many cases, this will help to make work undertaken in the HCST more relevant to social concerns, through more multi-dimensional problem definition and inquiry design. It will also help to ameliorate the inequity inherent in having groups in the community which are excluded from access to inquiry resources. It will be necessary to allow non-academic communities both to propose problems for inquiry and, where appropriate, to participate in and/or direct the actual inquiry process. The requirements of improved communication will be much easier to meet if the broader community is effectively involved in the whole inquiry process.[4]

For the programme to be successful, it will be necessary for Council to support a balanced programme package capable of meeting these requirements: innovative research support, inquiry capability development, communication and community involvement. This means a package which includes: a balanced set of grant programmes; infrastructure support; and a set of appropriate decision making principles and structures. More detail on each of these three areas is provided below.

It was the view of those attending the 1980 national programme conference that, particularly in the initial year or two of funding support, there should be an emphasis on building up capabilities in, on effective involvement of, and communication with the non-academic community. There was also agreement that a substantial proportion of available funding

should still be devoted to the support of inquiry projects themselves. In subsequent years of Council support, it was argued, there would be a steady shift of emphasis to support of specific inquiry projects. Support would continue to be provided, however, for sustaining significant levels of the other activities as well.

The total programme package now to be discussed (grant programmes, infrastructural support and appropriate decision-making principles and structures) was considered the one most appropriate for levels of support in the range of $500,000 to $1,000,000 per year over the life of the HCST strategic grants programme.

III.2 Grant Programmes

The programmes listed in Schedule 1 below are those agreed upon, from a wider list of possible initiatives developed at the final national meeting as being of highest priority. Some of those other initiatives are presented in Schedule 2, as examples of what might be done with a larger budget. Most of the programmes now to be discussed, especially those in Schedule 1, would serve to satisfy more than one of the four requirements discussed above. For example, a programme of secondments from non-academic constituencies to academic research teams might serve to enhance the inquiry capability of the academic team, to involve members of the non-academic community in HCST problems and inquiry approaches, and to facilitate communication with non-academic constituencies.

Schedule 1 (Higher Priority Programmes)

A. Problem Workshops

These are workshops which involve both non-academic groups and academics in identifying problems which deserve inquiry, identifying appropriate objectives for inquiry and the values which guide the choice of those objectives, helping to define an acceptable methodology, and defining the set of human skills and other resources needed to carry out the inquiry. Such workshops might be either regional or national, depending on the nature of the problems sought to be discussed. Their function is closely connected to the next component.

B. Specific Inquiry Projects

A large number of projects will have as their focus a particular theoretical or applied topic. The lack of space devoted here to examples of such projects should not be taken as an indication of their lack of importance. For numerous illustrations of the richness and diversity of possible (and important) areas for inquiry, readers should consult the working document on The Human Context for Science and Technology, or their daily newspaper.

In addition to these, two other types should be singled out for specific attention. These are projects which have, as their central purpose, the

strengthening of the field; as such, they might not normally be considered eligible for funding:

i. <u>Exploratory/Feasibility Projects</u>:

Preliminary projects focused on particular problems or areas of basic understanding, and aimed at developing an initial formulation of objectives, methodologies, needed resources, likely budgetary demands and time scales, etc. Such projects would be expected to lead to "mature" inquiry proposal.

ii. <u>Methodology/Capability Projects</u>:

Projects which focus on research into appropriate methodologies for the HCST area (eg. evaluation or development of methods of assessing social impacts of specific technologies); on developing interdisciplinary team experience and training; or on other areas concerned with the theory and practice of inquiry in the HCST area.

C. <u>Secondment</u>

The secondment programme would permit academics to spend time in non-academic settings to engage in specific projects and/or to inform themselves at first hand of problems and issues in an area where they are already engaged in inquiry. It would also allow non-academics to move into an academic setting, either to contribute to an ongoing effort or to

inform themselves of methodologies and resources, with a view to employing these when they return to their non-academic situations. For example, a staff member of a trade union could join an academic research team inquiring into health conditions in the work place, with a view of improving the team's problem definition and research approach, and would take back to the union the capabilities, information and insights acquired in the course of the team's work.

D. Fellowships

Two types of fellowships were identified as having particular importance for the HCST field.

i. Inquiry Leave Fellowships:

Specifically to facilitate the development of appropriate teams with HCST research capability and/or support the start-up phase of an interdisciplinary team intending to work in a particular subject area. Leaves might allow either part-time relief from teaching or other duties or full-time relief from duties for part of a year, depending on the programme. Such fellowships would complement the secondment programme in many cases.

ii. Re-orientation Leave Fellowships:

Fellowships specifically designed to permit researchers, typically academics, to retrain themselves in other fields or skills felt to be necessary for understanding and practising appropriate methodologies for the HCST area. Typical examples might be a researcher in technology assessment taking time to learn the economic history of technological development, or cost-risk-benefit analysis; or a social historian of science taking time to study the development of paradigms of scientific progress in the philosophy of science and their relationship with the development of research methodologies within science itself.

The above grant programmes, as mentioned, were identified as having high priority. Moreover, it was felt that a balanced funding programme would involve funding each of these four types of programmes.

It will be recalled that the concensus of the final national meeting was that emphasis should shift over the life of the strategic grants programme in HCST from the development of the area and the improvement of communication to "mature" inquiry projects. Beyond the general principles outlined earlier, the final national meeting did not develop firm guidelines for the apportionment of funding among the various programme components. That meeting did achieve a surprisingly high level of agreement, although some differences continued to exist about the relative priority of the programme categories. Relatedly, it was felt

that more experience was needed with the cost and effectiveness of particular programmes, and with the number and quality of proposals they generate, before firm longer-term decisions could be made about the percentage of funding to be allocated to particular programme components.

Schedule 2 (Lower Priority Programme Components)

Beyond those programmes outlined above, a number of other programme components were identified, all of which were felt to have merit, but not to have the urgency or prority of those mentioned above. Should funding permit, they too should be added to the programme; the resultant programme would represent something approaching comprehensive support for the HCST area.

i. "Centre of Excellence" Grants:

To develop centres of excellence in various areas of the country where the basis for these has developed naturally under other components of the programme; and to allow such centres of excellence to continue operation and to apply their skills to a succession of HCST projects.

ii. Communication Package Development

Grants to prepare packages of communication aimed at mass media, schools and other social institutions which reach large audiences.

In the interim, under more restricted funding, it is likely to prove much more efficient to develop useful relations with mass media so that the HCST area can rely on insightful mass media coverage, rather than incurring the expense of special grants.

iii. Course Development Grants:

Specifically aimed at providing the resources to develop special programmes of study in the HCST area, whether for academic institutions or for extra-academic educational programmes. (There was some question whether this activity might lie outside the terms of reference of Council, but it was nonetheless felt to be of sufficient importance to propose as a component of a mature HCST programme.)

iv. Graduate Post-Doctoral Fellowships:

A programme of "standard" graduate and post-doctoral fellowships, of the sort now provided by council, but specifically to encourage interdisciplinary work in the HCST area.

III.3 Infrastructure Support

The programme elements described under Schedule 1 above are necessary for the development of the HCST area. But, by themselves, they will not assure its balanced development. Some form of specific support for

infrastructure in the field was felt to be necessary: because HCST does not have an existing disciplinary base, an institutional support structure analogous to existing disciplinary academic departments, or the budgetary protection afforded to disciplinary fields; and because keeping alive the network of HCST researchers initiated by the process of the past 18 months will require specific further initiatives. The following approach was suggested:

A. Regional and National Secretariats

A Regional Secretariat in each of four general regions of Canada (Atlantic Canada, Quebec, Ontario and Western Provinces) should be established with adequate decision-making power and funding to coordinate the following activities:

(a) Activities designed to support the development of communication, both internally to the HCST field and externally between its own participant and other constituencies. For example, there is strong support for funding a project to develop a directory of individuals and groups working in the HCST field, and of important resource centres. Series of regional meetings could be held to build the HCST community within a region, along with a programme of publicity designed to announce workshops and inform people outside the existing network of the activities under way in the field. Special efforts should be made, in this connection, to reach those groups which are normally excluded from direction of, access to, and participation in

research.

(b) Providing a focus for the organization of regional problem workshops.

(c) Assistance in identifying appropriate membership for adjudication panels, and for a National Secretariat (see below).

Further, a National Secretariat should be established. This Secretariat would coordinate the development of communication links at the national level, provide a coordinating focus for workshops with a national character and assist in identifying appropriate membership for adjudication panels. There has been strong support for the production and distribution of an HCST newsletter -- an activity whose coordination would be an important part of the function of the National Secretariat.

It should be emphasized that the communication activities discussed above are a central component of the package being recommended to Council; communications-related activities should be supported whether or not regional and national Secretariats are established.

B. HCST Society

There was strong support in the reports of the regional groups, reflected at the 1980 national programme meeting, for the formation of a national HCST society. It would specifically be charged with maintaining a network of those with HCST-related concerns, with identifying problems in

the field, with reviewing research activities and progress in the HCST area resulting from them, and with providing a supporting framework for the involvement in the HCST field of people outside the academic community.

It seems most logical to satisfy these two infrastructural requirements by identifying the National Secretariat as the national HCST Society executive, and regarding the objectives of such a society as being met by the functions assigned to its national and regional Secretariats.

III.4 Decision-Making Principles and Structures for Funding Inquiry

A. Funding Inquiry: Eligibility and Assessment Criteria

With respect to the eligibility of persons proposing projects under HCST programmes, there was agreement at the 1980 national programme meeting that both academics and non-academics with demonstrated or demonstrable relevant capabilities, whether as individuals or in teams, should be eligible to make proposals under the programme. Indeed, the ability of academics and non-academics to initiate eligible proposals under the scheme was <u>not</u> to be restricted only to their collaboration. There was a strong feeling at the final national meeting that (for instance) advocacy groups themselves should be able to receive funding support.

As for the eligibility of specific topics, themes or approaches, as Section II indicated, the HCST area is characterized by a wide range of

concerns. All of the concerns represented in the description of the HCST area in Section II, and elaborated by the descriptions in Annex 1, should be eligible for funding under an HCST programme supported by the strategic grants programme.

It is anticipated that fundable proposals in the HCST area would probably involve work that both is oriented toward actual human problems and includes some reflective examination of the assumptions and the methods used in the analysis (and their effect on the conclusions reached).

In keeping with these concerns, applications for funding of inquiry in the HCST area would be assessed on the basis of a number of considerations, including:

(a) Does the project have social relevance? Has this social relevance been identified and adequately explained?

(b) Does the proposal involve non-academics as well as academics, where appropriate?

(c) Have the fundamental assumptions, presuppositions, values, and beliefs underlying the proposal and its methodology been identified?

(d) Does the proposal involve people from more than one area of expertise, interest, training or background?

(e) Does the proposal cultivate the HCST field? For example, a proposal might cultivate the field by enlarging the network of people involved in the HCST area, by educating others, or by developing structures within the HCST field.

(f) Has provision been made for communicating the outcomes of the proposal? For instance, how will the results of research be communicated to academics and/or to the public audience interested in the problem that has been investigated?

None of these individual considerations should be regarded as necessary conditions of receiving funding. The only mandatory criteria are that proposed projects fall in the HCST area, that they are proposed by those eligible for funding from the HCST programme and that they demonstrate a soundness of inquiry design and approach. Thus (a) - (f) constitute a set of desired, but not necessary, characteristics for inquiry projects in the area.

Although the questions which make up the list are most applicable to funding proposals for specific inquiry projects (Item B under Schedule 1) both the questions themselves and their motivating concerns provide a useful set of indicative criteria for application to all other categories of proposal.

B. The Adjudication Process

With respect to the review and adjudication functions, the 1980 national programme meeting recognized that the nature of the HCST area, with its emhasis on interdisciplinary research and non-academic involvement, etc., makes it particularly vulnerable to evaluation on the basis of criteria insufficiently broad to encompass the concerns and methods appropriate to the area.

i. Peer Review

It is essential that a special pool of external reviewers be set up for HCST inquiry proposals. This pool should include reviewers with experience in the HCST field, and/or with sympathy for the concerns and objectives of inquiry in the area. The pool should include people from outside the academic community as well as from that community, and should provide balanced representation of the humanities and social sciences.

ii. Adjudication Panels

There was a consensus at the 1980 national programme meeting that adjudication panels should be comprised of persons with a strong interest in the area and should, wherever practicable, represent a full range of expertise, concerns and perspectives, including, for example, a balance of academic approaches and national interest

constituencies.

There was some difference of opinion on two issues: whether regional adjudication panels should be created and whether the national panel's composition should be decided on the basis of principle (a) or principle (b) [below].

The two selection principles can be summarized as:

(a) The national panel should represent a full range of expertise and perspective incorporating, as far as practicable, a balance of academic concerns, national interest constituencies and regional representation.

(b) The national panel should represent a full range of HCST expertise and perspective incorporating a balance of academic concerns and national interest constituencies, as far as practicable, but placing primary emphasis on balanced regional representation.

Towards the end of the final national meeting three specific "models" emerged and were discussed:

i. There should be regional adjudication panels and a national adjudication panel; the national panel should be selected on the basis of principle 'b'.

ii. There should be a regional adjudication panel and a national adjudication panel; the national panel should be selected on the basis of principal 'a'.

iii. There should be a national panel only; it should be selected on the basis of principle 'b'.

No clear majority emerged for any of these alternatives at the final meeting. It should be noted that division of opinion on this issue corresponded fairly closely (but not entirely) to the regional origin of the delegates: the Western and Atlantic delegates tended to favour a stronger form of regionalization than the delegates from central Canada.

It is perhaps not surprising that the participants did not agree on a final concrete recommendation in this area, or on the desirable "split" of functions between regional panels (if any) and a national panel. What is in fact surprising is the degree of agreement which did emerge on the principle of regional representation and consideration for regional concerns, however implemented. For instance, some delegates opposed regional adjudication panels purely on the grounds of practicality -- it was felt that a greater level of funding than anticipated could justify establishing such panels. Others, while not entirely opposed to regionalization of the adjudication process, felt that it could have the effect of "writing out of the script" consitutencies with national importance, but little geographical identification with any particular

region (eg., women affected by the electronics revolution in office work). There was general agreement that regionalization of infrastructure functions (the establishment of Regional Secretariats) was appropriate, and further agreement on the general principle of equitable distribution of available funds among regions.

Flexibility and some experimentation on the regionalization question by Council would be appropriate, building on the base provided by the alternative concrete proposals made, the concerns motivating those proposals, and the elements of concensus which did emerge from the 1980 national programme meeting. Actual experience with the administration of the programme will help to resolve many of the remaining questions.

AFTERWORD

It is my view that this report articulates a broad and effective consensus within the community of those who have been involved in discussions of the nature, value and needs of the HCST area.

Furthermore, I believe the lengthy and careful review process which culminated in the second national meeting has led to a well thought out, well motivated package of proposals which, if effectively supported, will indeed address basic needs in the HCST area. It seems clear to me that the urgency of the human considerations involved, and the value to the Canadian community of progress towards the resolution of the problems and questions which they raise, argue that continued development of the HCST area, and continued support of the emerging crystallization of consciousness within the Canadian community of HCST concerns which has been initiated, should be strongly supported by Council.

I hope that this report will provide an adequate point of departure for more formal, more visible, more effective development of the concerns of the HCST area.

C.A. Hooker

St. Mary's, Ontario

November 1980

REFERENCES

[1] Hooker, C.A., *The Human Context for Science and Technology, a Preliminary Report*. Prepared for the Social Science and Humanities Research Council, 1979. An edited version of this report was published in Schrecker, T. and C.A. Hooker, eds., *The Human Context for Science and Technology*. Distributed by the Social Science and Humanities Research Council, May 1980.

[2] Schrecker and Hooker, eds., *op cit*.

[3] Editor's note: Comments subsequent to the exercise on which the present report is based have questioned what was seen as the identification or confusion of science and technology built into the use of the phrase "science and technology" throughout the exercise. It is unfortunate if this impression was created. Certainly neither the suggestion that science and technology are the same thing nor the inference that statements made about the development of the one would automatically be true about the other were intended. What the linking of science and technology was meant to reflect is that in our own social or "human context" the two are often closely related and the the imperative of considering "the human context" applies equally to both.

ANNEX 1

Excerpts from The Human Context for Science and Technology
A Preliminary Report, prepared by C. A. Hooker for the
Social Science & Humanities Research Council, 1979

III. THE HCST FIELD: SOME PRELIMINARY CHARACTERISATIONS

As remarked earlier, the HCST field is the focus of a number of interests in the interface between the practice of science and technology and the larger human, especially social, context in which those practices occur. One characterisation of the field has already been offered, namely as a field of related interests held together by a common perception (the pervasive importance of science and technology to contemporary life) and a common concern (to respond to contemporary science/technology-generated problems). This leads to one way of locating interests in the field.

There are two natural, complementary responses to a problem, to want to understand it and to want to resolve it. And even in the absence of urgent problems, there are the desires to understand, and to anticipate and prevent problems. There are two poles of concern, then, which hold practitioners between them, understanding and action. There is another dimension which locates a dominant kind of orientation which a researcher brings to the field, an interest in normative theories, methods and activity orientations as contrasted to an interest in empirical theories, methods and activity orientations. Some researchers bring normative philosophical theories of science to bear on understanding the development of science as such. They might be viewed as combining understanding and normative orientations. Some researchers, on the other hand, employ empirical studies of sciencepolicy with the intention of recommending more effective actions to policy makers. They might be described as combining action and empirical orientations. Obviously there are action-oriented normative studies (e.g. normative theory of technology assessment) and understanding-oriented empirical studies (e.g. history of cultural impacts of science) as well.

These are not the only way to view participants' interests. Another useful division is between a focus on general theoretical concerns (e.g. theory of science, or technology; theory of applied ethics), a focus on specific technologies, covering all dimensions (e.g. on values/social consequences of energy policy) and a focus on managerial responses to science and technologies (e.g. science policy studies, technology assessment, etc.). Yet another perspective might be provided by grouping researchers according to their interests in social change (e.g. change within science/technology), in the social institutionalisation of those activities, in the changing managerial/administrative responses to the former and in society at large, as induced by science and technology.

The HCST field is (unhappily) nearly unique in its desire *not* to separate theory and practice. Thus, as remarked, it is typical for participants' real interests to cover several combinations of orientations among the foregoing. Tester, e.g. begins with a fundamental critique of technology assessment theory, but with an eye to designing more acceptable assessment procedures. Brusegard begins by exploring the idea of a theory of social indicators, but uses it to emphasise the importance of the processes of developing and using social indicators. Guédon deploys a theoretical critique of normative theories of science to suggest new processes for distributing scientific research effort.

And of course the connections also flow the other way; many of the ethical/social issues in computing were not clearly focussed until the technology had been widely implemented (cf. Mowshowitz). The Berger Royal Commission's efforts to assess proposed northern energy developments (among other activities) focussed attention on the need for an underlying theory of assessment processes and of inter-cultural judgements (Tester) and so on. It is this kind of interaction, expressing the complexity of the reality addressed, which also helps to hold the field together - and which defeats those who would make just another "discipline" out of it.

Consider, by way of an example actually explored at the November seminar, the issues which cluster around the decision to drill for oil in the Beaufort Sea. The immediate question is "Was the decision justified, should we drill for oil there?" The immediate answer which suggests itself is that the drilling is justified by an elementary cost/benefit calculation: the value of the oil is greater than the cost to obtain it. But of course people have become increasingly resistant to accepting such replies without digging deeper into the issue. How do you value oil, especially when its price is clearly a matter of political decision? Is the oil needed at all? Why? How are such consequences as environmental/life-style disruption valued? How do risks enter the equation? And so on. I shall, then, back up for a moment to take a more systematic look at the important questions.

First, there is the historical policy setting, the suddenly urgent desire to locate new oil supplies. This raises questions as to the "need" for oil, focussing initially around thermodynamic efficiency but soon seen to be intimately bound to urban transportation and building patterns, rural use of machines/fertilisers, etc., and so ultimately bound to lifestyles and political choice processes. It also raises historical and cultural questions as to the development of the problem, its earlier perception, the reasons for the suddenness of its urgency. And it raises scientific and political questions as to the generation of reserves data, and the appropriateness of government dependency on data supplied by interested parties.

Second, there is the question of just distribution of the wealth generated by national resources, both between private and public interests and between different regions of the country. There is also the question of foreign versus national, and private versus public, ownership of resource companies, both as economic and as social-political issues. And this, in conjunction with considerations of "need", raises questions concerning the Canadian industrial infrastructure and social control of the Canadian economy.

Third, there are socio-environmental issues; disruption of traditional lifestyles (likely their eventual demise), potential disruption of Caribou migrations, threat of oil spill beneath the ice, and so on. Beyond this there is a possibility that environmental accidents might alter global climatic balances, with disastrous consequences for many more than will risk their lives to obtain the oil, or than will be disrupted in the obtaining of it, or than will consume it to their benefit.

Fourth, there arises the issue of energy sources and technologies alternative to oil, the conditions of their research, development and deployment, the assessment of their characteristics in all respects so far mentioned and the process of public choice among them.

Fifth, and finally, there are the costs and benefits of all sorts which thus accrue to future generations from chosen energy activities.

These are not all the dimensions to the decision. However this brief sketch suffices to indicate some of the important dimensions to the issue. It serves to highlight the deep involvement of normative considerations of many sorts, e.g. justice and equity, legitimate social control, responsibility to non-participants, choice under risk and uncertainty, needs versus wants, rights for other cultures and for natural objects, and so on.

Also raised are important social, political and cultural questions. One issue is that of the proper role of native peoples and cultures in Canadian society. Among many strands, mention is made only of the historical understanding of native and western cultural adaptations to the Canadian environment and its potential lessons for modern industrial culture. Other issues concern divisions of powers, regional disparity and national unity, the impact of international capitalism on Canadian economic structure, and so on. All of these issues also serve to provide so many demands to develop assessment and monitoring (indicator) methods and data to inform public choice processes.

There are questions raised concerning scientific and technological development and deployment and the control of these processes. Thus, e.g., new technologies were required for drilling in sub-zero temperatures, for transporting oil across permafrost, etc. and new developments in engineering and geological sciences to guide these. The safety, environmental benigness and industrial spin-offs of these developments require assessment. With respect to alternative technologies and the apparent difficulty of developing these, there are questions raised on the one hand about the theory and practice of technological "innovation in a cold climate" (cf. Science Council of Canada) and on the other hand about scientific and technological innovation in a quasi-underdeveloped, or "branchplant" economy (cf. Grey Royal Commission, Science Council of Canada, etc.) The connection of oil spills to climatic balance necessitates urgent attention to improved global climate theories as well as to assessment and monitoring processes. And beyond the immediate issues there are the subtler effects, e.g. on educational institutions and educational biases, of having an employment boom in these sciences with relative stagnation in the remainder - and, within the former sciences, of rapidly expanding activity in the specifically involved theoretical areas with relatively less interest in the remainder.

Many of these issues of coursego well beyond the confines of what might reasonably be viewed as the HCST field, which is specifically concerned with their social and evaluative dimensions, but that is both inevitable, and to the good. (Interaction enriches.) Many individual basic disciplines are

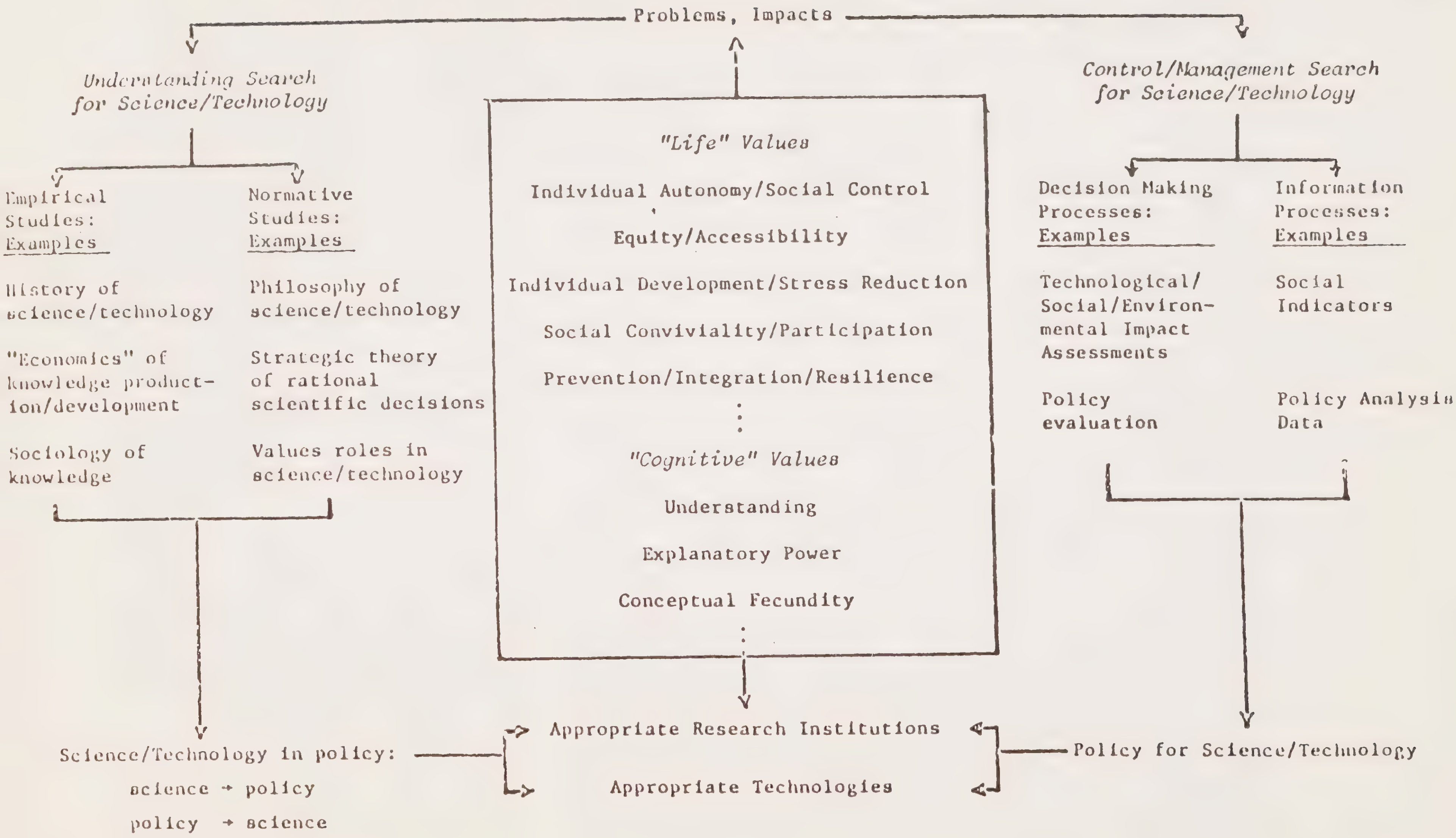
of course also legitimately involved, but this is to be expected and does not alter the necessity of integrated study. For what is in evidence here is that combination of normative, cultural, historical, social and political factors, and the intimate supra-disciplinary interaction among them, that is characteristic of the problems that form one primary motivation for the field. It makes their integrated study a uniquely Council responsibility, and a privilege.

One could have picked instead on many alternative current Canadian issues, from foetal monitoring (Hoffmaster) to micro chip processors (Mowshowitz, Martin, Valaskakis), from policy evaluation techniques (Sutherland) to technology assessment (Demirdache), and been able to exhibit the same richness of questions and aspects. the same necessity for integrated investigation.

Lest there be misunderstanding, let me remind that this problem-centred case has been by way of example of what motivates the research from that side; it is not to deny the importance of curiosity-motivated or anticipation-motivated research. Nor is it to downplay those more restricted studies still unique to the HCST rather than to field basic disciplines, intense pursuit of which is essential to provide a foundation on which to approach larger problems. For example, history of the impacts of science and technology on cultural images of persons, values and social structures and vice versa is one of these latter pursuits, often curiosity-motivated; it is nonetheless essential to developing useful theories of the science/technology-human society interface. Moreover, it provides an important frame of reference for action-oriented theories such as technology assessment and, often, for specific assessments (e.g. those of the Berger Royal Commission). This is not to emphasise history at the expense of other studies; historical studies were but the example chosen. It is to emphasise *the importance of maintaining the diversity of activities in the field, as well as a sense of its larger interactive cohesion.*

With this discussion in mind, some of the main themes emerging from the papers and seminar discussions may be set out in the accompanying diagram. Again, this diagram is intended to orient the reader to the field, it is not intended as a definition of it. Moreover, it is a partial representation, both omitting or hiding some interests (e.g. cultural and historical components) and unequally emphasising others (e.g. placing assessments as 'prior to' institutional re-design in the diagram flow).

The diagram represents several of the fundamental tensions animating the field: (1) the tension between understanding and action, (2) the tension between a narrower intense research focus and inter-disciplinary integration, (3) the tension between empirical investigation and normative investigation. Lying beneath these tensions is the tension within the researcher between the critical agnosticism appropriate to research and the commitment appropriate to being a person. *It is crucial to the recognition of the uniqueness of this field that these tensions be recognised as among its central animating features.*


Problems, Impacts
Understanding Search for Science/Technology
Empirical Studies: Examples
History of science/technology
"Economics" of knowledge production/development
Sociology of knowledge
Normative Studies: Examples
Philosophy of science/technology
Strategic theory of rational scientific decisions
Values roles in science/technology
"Life" Values
Individual Autonomy/Social Control
Equity/Accessibility
Individual Development/Stress Reduction
Social Conviviality/Participation
Prevention/Integration/Resilience
"Cognitive" Values
Understanding
Explanatory Power
Conceptual Fecundity
Control/Management Search for Science/Technology
Decision Making Processes: Examples
Technological/Social/Environmental Impact Assessments
Policy evaluation
Information Processes: Examples
Social Indicators
Policy Analysis Data
Science/Technology in policy:
science → policy
policy → science
Appropriate Research Institutions
Appropriate Technologies
Policy for Science/Technology

Tensions can be fruitful only if they are kept in balance. Some researchers may temporarily resolve these tensions by concentrating on some specific research (e.g. on empirical sociology of Canadian research) or through involvement in some specific action (e.g. conducting an impact assessment), but ultimately they must be driven back to the larger context if their work is to remain relevant and informed, and if they are to remain whole persons. Thus *it is important that a balance be maintained among research interests, and equally important that the larger interaction and integration of these activities be fostered.*

The diagram provides a convenient way to organise several of the important themes which emerged during the process. I have chosen six of them to comment on here.

(1) Human values, aspirations, concerns, interest - whatever language one prefers to use[13] - underlie the field. From which follows the first theme: the importance of providing fundamental, evaluative critiques of the practice of science and technology.

Whatever their other differences, people agreed that part of the reason for contemporary societal problems stems from a myth of the value neutrality of technology (and for some, of science as well) with the consequent absence of societal processes for discussing the human impact of technologies and for choosing technologies and technological designs. From which follows also the importance of articulating and clarifying the values of Canadians surrounding science and technology.

(2) Values uninformed are blind; thus the second theme complements the first by emphasising the importance of studying the domain of science and technology as a human activity, especially as a strategic and social activity. Understanding involves developing both normative and empirical theory and bringing them into interaction with one another, e.g. bringing a normative decision-theoretic model of scientific choice to confront both historical studies of scientific decisions and contemporary studies of the social organisation and motivational patterns of scientists, or bringing a managerial model of technological innovation/development to confront historical case studies and contemporary studies of pure-applied linkages. Without informative theories in these areas there is no systematic basis for action.

(3) The third theme focuses on the need to evolve a deeper understanding of the loci at which, and the mechanisms by which, science and technology enter the larger society effecting social change. Why did we find it so hard to predict in advance the multiple revolutions now being produced by the micro-electronics industry. Why is it still so hard to pinpoint the societal impacts of the next generation of multi-component silicone chips? Mere ignorance? Mere complexity? Or a superficial grasp of underlying structures and processes? Conversely, we are in equally urgent need of deeper understanding of the precise structures and processes through which society helps to

shape science. If science once "did girt fo'ard on the back of a powder cart", does it now? Must it still? What of mass consumerism, the energy crisis and urban mindscapes as shaping influences on science?

(4) Among the myriad interactions between science/technology and society one group seems deserving of special attention: the use of scientifically/technologically generated information as input to public policy processes (including public policies for science and technology themselves) and conversely, the impacts of public policies, especially science policy, on science/technology. There is an urgent need to know what scientific/technological information is available (e.g. what social statistics), where it is in fact used (if at all) and with what effect. There is an equally urgent need to consider what information should be made available and to whom and for what purposes. Conversely, public policies toward science often have counter-intuitive and counter-productive results; there is an urgent need to know a great deal more about the public management of cognitive enterprises before governments embark on elaborate science policies. And of course there are then the equally urgent normative questions concerning the limits to public control of research and, conversely, the limits to scientific/technological research because of the public interest.

(5) If appropriate information is unavailable, new research is needed to provide it. At the present time, e.g. there seems a clear need for greater information in such areas as occupational risk and the psycho-pathologies of work roles; the cultural impact of electronic information exchanges; the social costs of present workplace/home/school divisions of time, roles and rewards; the potential values impacts of genetic pre-selection/screening, foetal surgery and like techniques; and so on. In some cases there are identifiable "target groups" which have special interests in the research but which are often denied it (e.g. unions in the first example); in other cases everyone is affected. But there may be no mechanism for focussing a demand for HCST-style research. In either case new processes for initiating and supporting research need to be implemented. If the information is available but actions are unsatisfactory then again new decision making processes need to be designed and implemented. This introduces the fifth theme, the need for research into alternative research institutions (perhaps, e.g. a publicly supported 'store front' research organisation?) or perhaps support for new research alliances (e.g. to use integrated systems - theoretic tools to approach such problems as energy wholeistically? Etc.) and the need for research into alternative decision making processes (What role for public groups in decision making after the Berger, Hartt and Porter Royal Commissions? What role should the public play in relation to technology impact assessments in public decision making? Etc.).

(6) The final theme focusses on the designs of the technologies and other research products. Hitherto, assessments (technology, environmental, social) have largely been reactive; given a technology or technique already deployed or about to be developed, what are its impacts and how can the negative ones be mitigated? The point of alternative designs for research and development processes is to be able to reflect proactive assessments back into designs that will pre-empt problems. Appropriate technologies, techniques and research

programmes are to reflect as far as possible the operation of the preventive approach, pre-empting the necessity for the curative reaction. What, e.g., is a set of energy technologies appropriate to geography, resources, international relations and to the social values of Canadians? How do we design communications technologies that will enhance autonomy and conviviality rather than dependency and isolation? What can Canada learn from, and contribute to, developing nations in respect of technological designs, and scientific research designs?

These six themes help to locate the main areas of concern in the field, though they do not exhaust all legitimate concerns and activities. Beyond them, however, lies a more encompassing concern which emerged repeatedly in the process and which deserves to be listed as a seventh theme, but for its encompassing nature. The concern is with the uncovering of hidden assumptions, biases, limitations and other human 'traps' which might lie in the very form of the enterprise itself. One form of its expression is a questioning of the limits of technique; in another form there is a questioning of the limits of rational scientific knowing itself.

A more specific form of the concern was expressed in the "side effect syndrome", the scientific habit of dividing research into narrowly confined packages with the result that problems solved in one area create new problems in others. In this case neither 'technical fixes' (natural science) nor 'technique fixes' (social science) would provide a solution, only a worse 'side effect'. It is necessary to step back and relfect on the research enterprise itself.

The necessity of being able to step back and reflect deeply on the situation was a widely held perspective and led to an important specific conclusion: whatever the importance of methods and material drawn from the natural and social sciences, the humanities area (its concern, not the collection of disciplines) has a unique role to play, providing a kind of ultimate context or envelope of human concerns, ultimate questionings and deeper-than-method reflection which the sciences in practice do not and, beyond some point, cannot raise.[14]

On the managerial side, the same concern found its expression in the insistence that those on the receiving end of research and technological deployment and those without narrow disciplinary axes to grind, be represented in, or involved in, the basic choice processes. Diversity beyond vested research/development interest was seen as a sageguard against unnoticed faults in conception and practice. These concerns lead to the discussion of Part IV below.

Themes are neither conceptualisations of a field nor a catalogue of acceptable research projects within it; they are foci of interest and commitment. Research projects will be discussed shortly, for the moment I want to emphasise that, though these themes provide some general guidance as to the kinds of studies which were thought to be important, they do not provide a way to attach priorities to specific projects in the field. There was considerable caution expressed about attaching priorities to projects at all in some kind of

absolute way and indeed no specific sets of priorities were proposed. A more refined set of guidelines for project choice in cases of technology-focussed projects was developed by one of the seminar discussion groups; this is reprinted as Annex 2 to this article, as an example of the kind of material tentatively discussed. What was generally agreed was that the funding focus should not be too narrow: (i) Research support should be spread across severjal different areas or levels of concern in the field (e.g. those shortly to be listed). (ii) A balance should be struck between the specific research projects to be discussed here and the institutional developmental processes discussed in Part IV. Both types of support should be provided. (iii) Priorities, if set at all, should be set through a widely-based, open consultative process. This latter view is discussed further in Part IV below.

Having presented a thematisation of the HCST field, I turn now to a different, issues-oriented way of looking at its current foci of concern.

What follows is a selection of projects suggested by those who attended the seminar and by those who prepared background papers. The selection is partial in two ways. First, as mentioned previously, not all of the areas in the HCST field were represented in the process. Second, only a selection of the suggestions made is presented here. The reader is left to generalise appropriately.

For purposes of organising the list of suggested projects a convenient categorisation is employed; it should not be viewed as the only legitimate way to organise the field. As the reader will note, the projects specified under the categories vary widely in their selected thematic emphasis.[15]

1. *THE PRACTICE OF SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT*

1.1 General Methodological Study

- Historical and philosophical studies which illuminate the relationship between the scientific process, national needs and the strategic, aesthetic and ethical themata which scientists use in their work.

- Comparative studies of the social, political and historical role of science and technology: e.g. studies making comparisons between Canada and other countries (say the U.S. and Australia). National development theory could provide one organising focus for these studies.

- Examination of the relationship between scientific/technological dependency and social vitality, with special reference to Canada.

1.2 Innovation and Development Study

- A critical examination of the impact of centralisation versus regionalisation on the development of a capability for technological innovation and scientific "production".

- An evaluation of the concepts of appropriate technology and appropriate scientific research, with specific reference to identifying characteristics of the infra structures required to ensure appropriateness.

- An examination of the relationship between the patents system for new scientific techniques and new technologies, and the existing social power structure.

1.3 Policy Studies

- Examination of how the choice between the development of specific scientific research programmes and specific technologies - especially the choice between 'big' and 'small' science and technologies - is made. And, specifically, does institutional inertia in public and private sectors reduce scientific and technological variety and limit choice?

- A study of Canada's export of technology and scientific techniques: the roles of the public and private sectors; the special role of technique and technology exports in Canada's aid to the Third World, including a critical evaluation of the social, cultural and economic values embodied in these together with the implications for a reconsideration of Canadian policy.

2. *TECHNOLOGY IMPACT*

2.1 General Methodological Study

- Work on the theory of public policy and decision-making relating specifically to the role of technology in society, and focussing on the issue of the development, deployment and use of appropriate technology.

- An examination of different methods by which public response might be gauged regarding risk information related to the deployment of specific technologies.

- A critical examination of approaches to organising and evaluating information from the social sciences directly and indirectly relating to technology impact, so as to make that information more accessible to interested groups and individuals.

- Work directly examining the relationship between the dynamics and functions of values in society and technology development, deployment and use.

- Work evaluating the common assumptions and methodological underpinnings of technology impact assessment, social impact assessment and environmental impact assessment.

- Examination of the relations between impact assessment theories (technology, social, environemntal) and social data production, e.g. social indicators.

- Explorations of the inter-relationship between the nature of technological design for production in the work place and the human value of the work place; explorations which examine such issues as: When is the social organisation of a work place unethical? What are the ethical criteria for acceptable machine designs?[16]

2.2 *Applied Areas: Specific Technologies*

2.2.1 *Biomedical*

- Critical, inter-disciplinary examinations of the extent to which and the manner in which the new reproductive technologies should be controlled; such studies must scrutinise the future impact that these technologies are likely to have on society and develop a theoretical framework for making normative decisions concerning which social state is acceptable/desirable.[17]

- Studies focussing on the key normative issues surrounding the development, deployment and use of behavioural control and modification technology (such as: "Given the ability to design human beings, what kinds of human beings ought to be produced?")[18]

- Studies focussing on institutional issues relating specifically to health and health care in the work place.

2.2.2 *Energy*

- Examination of the social, political and economic implications of centralised versus decentralised energy systems.[19]

- Examination of the value preferences of the major players and shareholders in the emerging energy society.[20]

- Comprehensive assessment of the impact of new energy technologies such as solar energy and heavy oils.

- An investigation of the occupational health effects and resulting human impacts of backfilling uranium mines.[21]

2.2.3 Computers

- Basic research studies on computer technology with the aim of developing an integrative framework for the study of the computer-society interface; one such project would examine the impact of personal data systems and electronic monetary systems on the relationship between the individual and the political structures.[22]

- Studies of the likely impact on employment and the social fabric resulting from the introduction of microcircuitry.

2.2.4 Communications

- Critical evaluation from a humanities/social science perspective, of technologies such as Telidon, whose deployment is both underway and potentially widespread.

- An evaluation of the effects of communication technologies on culture, behaviour and human values (e.g. do heavy television users differ significantly in cultural, behavioural and value-specific ways, from light television users?)

- An exploration of technological conditions conducive to achieving balance, autonomy, convivality and freedom of expression in communications technology.

- Critical studies of the media's portrayal of particular social groups: for example an imagery and content analysis of the presentation of organised labour by the C.B.C.

- Explorations of the likely effects of increased "information" on particular aspects of the production and distribution of material, goods, services, advertising, education, entertainment and interpersonal communication.[23]

3. *FIELD OVERVIEW*

3.1 Methodological/Conceptual Study

- Exercises aimed at identifying and clarifying national values concerning appropriate scientific and technological development and use patterns for Canada.
- A description and critical evaluation of effective processes for moving towards a consensus on human values which can provide the criteria and conviction for choosing the focus, methodology and use of research in the domain of science and technology.
- Studies focussed on the conceptual (and practical) integration of the HCST field as a whole.
- Studies examining the foundations for assessing the social impact of science and technological development; one such study would involve the critical appraisal of individual and social preferences to serve as a basis for evaluating the appropriateness of particular technologies.[24]
- Explorations of new ways to organise information (on the development and impact of science and technology) so as to render it of greater use to particular groups and individuals currently with unsatisfactory access to information.
- Examinations of different indicators of social well-being for purposes of public policy making and social decision making relating to the impact of science and technology.[25]
- A description and critical evaluation of the production and consumption of institutionalised knowledge in the science/technology domain; one theme for possible emphasis: How do federal arrangements preclude consumption (and production) of certain kinds of knowledge?

As I have repeatedly insisted, there are many informative ways of focussing the interests in the field. A principle of organisation alternative to that just presented is to look at the level of generality at which issues are being presented. In order to heighten the appreciation of the richness of the field, I now offer a very rough grouping of the background papers according to this latter intuition, which largely (though not wholly) cross-classifies that just given. The divisions chosen are matters of convenience, the issues themselves form a continuum of increasingly concretely focussed concerns. Many other supporting authors could have been referred to; many other dimensions to these issues would assuredly have been explored more fully by Canadian authors had there been more time to tap resources.

1. FRAMEWORK CHALLENGES

Understanding (intellectus) is not necessarily reducible to reason (ratio, reckoning). The reduction is much less obvious still in less narrowly cognitive areas, e.g. emotional integration, spriritual development.

But approaches to the self and relations with other selves and with the larger world are the foundation for approaches to social and political structure/functioning. In our present problem-ridden historical context it is no accident that a variety of philosophies offering an alternative society based on an alternative conception of the self (e.g Buddhism, N'Amerind religions) have received renewed attention. These approaches also provide their own diagnoses of the errors of our present culture, in particular of the limitations of the scientific approach to problems.

Such challenges may take the form of querying the domination of value by technique and the foundation of technical rationality, querying the foundation for claiming to be able to develop technical tools to evaluate public policies (Sutherland) and challenging the value-neutrality, in particular the political neutrality, of any enterprise, including the studies of values and the sciences themselves (Guédon).

The humanities generally represent the western repository of approaches of this sort, they keep open the prospect of alternative understandings of our historical setting.

These challenges then pose deep questions concerning the ways in which human beings, in particular human values and the ends of life, are to be understood in themselves and in relation to human sciences and technologies. They are of first rate importance to pursue.

2. WORLD VIEW CHALLENGES

Closely related to the former issues in many cases are questions arising from alternative conceptions of various fundamental aspects of the world. If the issues concern the nature of values and the ends of life, we may quickly return to framework challenges.

But there are other debates, e.g. between neo-classical economic conceptions of *homo economicus* and alternatives ('buddhist', Kantian, communist, etc.), between centralist contractarian approaches to socio-political structure and alternatives (Platonist, anarchist, Catholic Christian, communist), between capitalist-industrial conceptions of technology and resource use and alternatives

(appropriate technology, conserver society, 'soft' policy paths). These issues are raised e.g. by Jackson, Knelman and Tester.

They do not simply concern specific problems, but the framework for the formulation and evaluation of problems. They concern, not simply specific methodologies and techniques, but the choice of *kinds* of methods and techniques - *and* the recognition of limits to them. Like framework challenges, these issues reveal the basic assumptions on which all else to follow ultimately rests.

3. FUNDAMENTAL THEORY CHALLENGES

There is a useful distinction between general, fundamental theoretical principles and detailed theories of particular subject matters, e.g. between the general principles of thermodynamics and the specific theory of heat pumps, between the general theory of economic choice and the specific theory of industry location. The distinction is useful, though not always sharp. Here we concentrate on the level of general theory.

There is at present no general theory of the technology:society interface, i.e. no general theory of how technological change interacts with social change (Mowshowitz), no general theory of the structure and dynamics of human life as a time-structured development and of the resulting occupational, locational and social dynamics which that structure induces (Brusegard), no general theory of a conserving, environmentally compatible economics (Jackson). These lacunae and others like them stand in the way of developing a coherent framework for the evaluation of societal activity, even when world view assumptions are clarified.

With respect to science itself, we have no general theory of the nature and dynamics of 'pure' science and of the science:society interface (Bindon), and much too little empirically-based theory of the historical development of scientific institutions, the historical effect of public science policies on scientific research, and so on. There is no recognised theory of the proper relation between scientific information and public policy making processes (Miller, Sutherland).

These latter issues point to even more serious lacunae: there is no coherent theory of values and ethics capable of acting as a framework for the normative dimensions either of public policy making and like societal issues or of the specific dilemmas posed by particular technologies (Braybrooke, Hoffmaster, Jackson, Keyserlingk).

It is obviously impossible to progress far in understanding while operating with piecemeal frameworks (though framework progress is often stimulated by piecemeal progress).

4. INSTITUTIONAL CHALLENGES

All of the foregoing challenges in effect call for changes in the direction and balance of research and its use by various segments of society. None of these changes can be accomplished without corresponding institutional changes. Some see these changes as simply those appropriate to removing societal ignorance, others see them as part of a fundamental challenge to the political economy of western society. Whatever the view, all are agreed that research and development institutions themselves need researching for alternatives and alternatives developed, that research-supporting institutions likewise need the same attention and that the relations between both sets of institutions and the various interest groups in society need careful and urgent attention. (See e.g. Bindon, Carpenter, Demirdache, Guédon, Miller). Some of these issues are taken up in Part IV.

5. CHALLENGES TO DEVELOP SPECIFIC THEORIES AND BODIES OF INFORMATION

If there are wide lacunae in our body of general theory, there are myriad specific theoretical and data gaps. Rather than attempt an exhaustive list I offer some examples from the background papers. Bindon: Lack of information on the institutional structure/functioning of science; Brusegard: lack of theory/data on the relation of subjective life satisfaction to objective social indicators; Demirdache: lack of a theory of combining normative and descriptive aspects of technology assessments; Hoffmaster: lack of a definite theory of the impact of the health care institutional context on ethics of individual decision making; Tester: lack of specific methodologies for obtaining and combining inputs to social impact assessments from differing cultural groups (including sub-groups within western culture).

6. SPECIFIC TECHNOLOGY FOCI

Many authors wanted to concentrate on a specific technology in all its dimensions (e.g. energy technology) or on a specific human function in all its aspects (e.g. communication), rather than select only a specific theoretical dimension (e.g. ethical issues). A specific methodology (e.g. empirical sociological study), a specific level of concern (e.g. managerial, or philosophical) or any other partial study. The richness of a given technology transcends partial approaches and brings them into interaction with one another, as I have earlier tried to illustrate. Hoffmaster, Keyserlingk, Mowshowitz and Valaskakis/Martin all represent this approach to some degree.

In conclusion, Part III has offered several different structurings of themes and issues for the HCST field. None can be taken to be more legitimate than the others, each sheds light on the inter-relations among issues and themes in the field and adds to the sense of richness and depth which the field indeed possesses. There is no embarrassment to these riches - indeed, every substantial field (including basic disciplines) can be cross-categorised in a similar way. Besides attempting to provide a rich operating conception of the HCST field for the reader, and to motivate its support, the main import of this exercise is that abstracted attempts at producing the conceptualisation of the field should be set aside in favour of pursuing the issues within it.

ANNEX 2

Letters from Alan Fox and Clifford Hooker
to participants in the HCST process

FUNDING THE DEVELOPMENT OF THE HCST FIELD

THE CONTEXT

This paper has been prepared as a framework for discussion at the regional workshops and among the wider readership, of the most appropriate ways that the SSHRC can provide support for the development of the HCST field. Although various suggestions are made regarding an approach to be taken, is not intended that the paper be an arbiter of the questions that need to be posed nor pre-empt discussion on the range of issues debated, but rather present a set of ideas intended to stimulate a response from the community concerned about the issues discussed in the regional meetings. It is hoped that from this discussion, guidance can be provided to Council on how to set up a new range of programmes for development of the HCST field.

It should be understood that the ideas and suggestions presented in this paper for the development of the field, are the views of the author and do not carry any official sanction, in that the paper has not passed through any internal staff review or Academic Panel committees.

THE FRAMEWORK

Three areas are suggested as the principle focii for development.

These are:

(i) Research capacity - the stock of people who are actively engaged in research on issues relating to the human context for science and technology.

(ii) Research Activity - high quality research adopting a holistic perspective, to better understand the complex relationship between scientific and technological innovation and the quality of life, and so guide ourselves over the next two decades and beyond.

(iii) Communication - the exchange of information and encouragement of dialogue among the research community and the wider concerned public.

Under each area, suggestions are made regarding possible approaches for funding. In many cases the programme outlines are vague and are no more than a suggestion of the general thrust that should be adopted in developing the field. A number of questions are raised regarding eligibility for grants and fellowships, conditions of award, and adjudication procedures. Other questions and issues will surely arise when attempting to develop parameters for the new programmes and will hopefully provide valuable debate in determining the most appropriate aims, form and structure of new programmes in the HCST area.

A. RESEARCH CAPACITY:

Factors -

Two factors seem to be of paramount importance in assessing the existing capacity for research:

(i) this is an emerging field, with relatively few active researchers. The growth of people doing either descriptive or prescriptive research on issues relating to the HCST field has not matched the rapid expansion of the science and technology field itself.

(ii) the HCST field is inherently interdisciplinary, yet few researchers adopt an interdisciplinary perspective or undertake coöperative research ventures.

New Programmes -

The aim of new programmes to build and strengthen research capacity in the HCST field should therefore seek to encourage more people to undertake research in the HCST field and also encourage them to adopt a holistic perspective in their approach to research. It should also seek to increase the quality and skills of those people presently undertaking research in the HCST area. It is proposed that this be done through two new programmes which would aim to:

(i) encourage post graduate students to follow an interdisciplinary path in their doctoral studies and undertake their dissertation research in the HCST field.

(ii) Stimulate cross-disciplinary perspectives among existing researchers in the field, by providing them with the opportunity to devote a period of time to study/research a problem in the HCST area in collaboration with others who have different disciplinary perspectives on the problem area.

INTERDISCIPLINARY DOCTORAL FELLOWSHIPS:

Aim - encourage doctoral students to do research in the HCST field, adopting an holistic approach.

Eligibility - requirements would generally follow those of SSHRC's Doctoral Fellowship Programme, except that the student would be required to undertake a programme of study in the HCST field adopting a inter/cross/trans disciplinary perspective.

Value and conditions of award - same as the Doctoral Fellowship Programme.

HCST FELLOWSHIPS:

Aim - provide interdisciplinary experience for existing discipline-based researchers.

Approach - two alternative approaches are to

(i) provide a fellowship for an individual to follow a course of personal study in an area outside that of his/her own training. An example might be a social scientist with an interest in, say nuclear energy, who felt the need to spend a period of time studying nuclear technology, so that he/she could better understand the nature of the nuclear industry; or,

(ii) provide a fellowship for an individual to join a research project conducted by people with different disciplinary perspective than his/her own, so that the fellowship holder could both contribute to the research project, as well as gain experience by working closely with others who view the problem area from different backgrounds.

Eligibility - "private scholars" (ie. non-university based researchers) and/or university researchers.

Value and Duration - in deciding on the value of the fellowship two alternative approaches are to either establish a fixed value, or else

to pay the difference between the partial leave salary and the applicants regular full time salary. Thought also needs to be given to the duration of the award. Should they be for a full year, or for a shorter period, say 3 months?

B. RESEARCH ACTIVITY :

Factors -

The tradition of classifying research by discipline at the SSHRC has tended to encourage discipline-bound research in the social sciences and the humanities. Those who step outside their specialty or discipline often encounter problems in the peer review process when their projects are reviewed by discipline specialists. There is therefore a need to provide the administrative channel to facilitate the interdisciplinary perspective in research. It should be recognized that the barriers to interdisciplinary research do not exist only in the adjudication of research projects, but also in the organizational structure of universities and the traditional approach to academic education.

It should also be recognized that there are very real risks to conducting interdisciplinary research. As the Preliminary Report notes, the bitter experience of those who work in interdisciplinary settings attests to the multiple barriers that stand in the way of people's breaking out of their disciplinary constraints. Reviewers of proposals in this area should therefore recognize the developmental nature of interdisciplinary research and not expect the consistency and cohesiveness that granting agencies have come to expect in discipline specialized research.

New Programmes -

It is suggested that the major emphasis in new programmes to support research activity in the HCST field should be to provide small development grants for two or more researchers to explore and develop plans to undertake joint research ventures. Provision should also be made for funding of a small number of larger interdisciplinary projects by researchers who have a proven experience in cooperative research.

It is also suggested that an important consideration at the time of application for support of research projects should be the expected plans for communication of the results of the research to the wider community.

The emphasis on the development of interdisciplinary research should not be construed as a negation of the value of the more traditional discipline oriented research which provides an essential foundation for the development of an integrated approach to large complex problems. It is suggested however that existing administrative procedures in SSHRC's research grants programme provide adequate opportunity for the support of research by the individual scholar, whereas similar opportunities do not exist for people who wish to undertake cross-disciplinary integrated projects. Hence, the emphasis on the development of group endeavours in funding research activity in the HCST field

SMALL DEVELOPMENT GRANTS:

Eligibility - "private scholars" and/or university researchers.

Value - it is suggested that the grants would be in the $3,000 dollar range and would provide for the basic direct costs of research as presently supported under SSHRC's Research Grants Programme. If it is thought desirable to cover salary expenses, either for university researcher who wish to be released from other university responsibilities or "private scholars" who need reimbursement for time taken off from their regular employment, the grants would have to be larger.

Adjudication Criteria - In the Research Grants Programme, relatively heavy emphasis is placed on the conceptual framework for research and the scholarly significance of the project. Recognizing the developmental nature of the proposed grants, it seems unrealistic and even undesirable to expect well developed theoretical approaches. It is necessary however to consider to what extent the adjudication process should emphasize such characteristics as: holism in approach, policy relevance, originality, teams including researchers from "the wider community", research plans and methods, communication of research results,...

MAJOR INTERDISCIPLINARY GRANTS:

Eligibility - "private scholar" and/or university researchers.

Value - consideration should be given to the question of whether there should be a maximum value for these grants, and if so, how much. Also, the question of eligible costs needs discussion and in particular the question of paying for research time for either university researchers or private scholars.

Adjudication Criteria - Again, the issues raised above under Small Development Grants require discussion to determine the most appropriate adjudication criteria. What emphasis should be given to the project being based on a sound disciplinary footing? Should special emphasis be placed on teams comprising of researchers from the "wider community"? How much importance should be placed on the potential policy relevance of the research?

C. COMMUNICATIONS :

There appears to be need for better communication both within the academic community and between the academic community and the world outside it.

Within the academic community there is need to encourage communication between social scientists and humanists, on the one hand and between both these groups and the science and engineering community on the other. Existing communication channels tend to flow along disciplinary lines and conscious effort is needed to break out of the disciplinary straight-jacket and understand the perspectives of others who approach the HCST field from a different orientation. Emphasis should also be placed in developing closer ties with the concerned public, both in formulating research plans and in communicating the results of completed research.

The various suggestions made below are tentative thoughts or possible ways of facilitating communication among the HCST community. Once again, the ideas presented are at a preliminary stage of development and in the group discussions it is anticipated that these ideas will be elaborated, criticized and revised. It is also hoped that other issues and approaches will be discussed.

1. HCST Association - thought should be directed to the need for the formation of a HCST Association and a national co-ordinating committee. If such an organization and co-ordinating committee is felt necessary, particular attention should be paid to its structure and responsibilities and also ways to ensure that it is responsive to regional needs and remains open and imaginative in its thinking.

2. Resource Directory - in a diverse, complex and emerging field where many issues cut across conventional academic disciplines, there may be a need for a directory of both researchers actively engaged in research in the HCST field and the various public interest groups who are also concerned with similar issues.

3. Newsletter - there is need for some central communications mechanism to keep the HCST community informed of significant research which is anticipated, is in progress or has been completed. One approch would be a publication on newsprint which could be producedfrequently, at relatively low cost and circulated widely.

4. Workshops - the regional workshops this year seem to have been successful in bringing together a diverse group of people who are concerned about the HCST field. Further meetings would help to extend the regional networks which are presently developing. Consideration should also be given to problem oriented workshops to stimulate discussion between academic researchers and the wider concerned public regarding a particular problem area within the HCST field.

5. Public Awareness - it is suggested that there is need to attempt to reach a wider public than those involved in the workshops, by providing modest funds to prepare radio documentaries or community seminars for journalists, politicians and the public at large.

D. DECISION MAKING :

Three principle concerns relating to the decision-making processes are the locus, the structure and the procedures for decision-making in the HCST field.

In their First Meeting Report, the Western Regional Subgroup recommended that regional panels be established to adjudicate and allocate funds for standard research grants, while a national panel would decide on major grants and communications grants. Neither the Ontario, nor the Atlantic Regional Groups discussed the issue of regional decision-making, so this question should be raised at the second meeting to determine whether the HCST community generally favour this approach and if so, in what areas.

In considering the structure of the decision-making groups thought needs to be given to the size and the composition of the committees. The Western Regional Subgroup recommended that the national panel consist of six members from each region, with the members selected by SSHRC from a list of 54 names of qualified people submitted by the

HCST Association. They also confirmed the general recommendation of November 1979 Preliminary Report that "the relevant decision-making groups within Council contain significant representation from a widely varied community base". (p.31)

On the question of procedures, thought needs to be given to the disirability of obtaining external written assessments on projects. While this may not be necessary for Fellowships, small development grants or communication grants, it may be desirable for the mahor interdisciplinary grants.

E. ALLOCATION OF FUNDS:

No mention has been made yet of the relative weight that should be accorded to the development of research capacity, the support of research activity itself, and communications, or to the individual programmes within each of these areas. The Western Regional Subgroup recommended that 40% to 60% of the funds should go to major research projects, 15% to communications and the balance to standard research grants.

Alan F. Fox
Division of Planning & Evaluation
SSHRC

August 29th 1980

The University of Western Ontario

Department of Philosophy
London, Canada
N6A 3K7

8th August, 1980

HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

TO: All participants in the HCST process

FROM: C.A. Hooker, National Coordinator
T. Burrell, Executive Research Assistant

With this letter you will receive the third (Maritime) report of three regional reports on HCST process and problems; the first and second reports (Western Ontario) should have already arrived. These reports record the first 1980 regional group meetings, following an initial November 1979 national meeting whose report you should have received much earlier. Subsequently, there will be a second round of regional meetings in September-October and, following that, a second national meeting whose main goal is to formulate a report to SSHRC concerning the form and substance of future support for HCST. All indications are that SSHRC will look favourably on the field, given a coherent national report in November, and that the field will receive substantial funding support in the years ahead. I hope then that you will join enthusiastically with me in the task of developing a well thought out report for SSHRC, backed by a rich support base of concerned people.

In 1979 we focussed, understandably, on what the field was, who was/should be involved, what kind of projects belong in it, what kinds of priorities (if any) should be assigned, and the like. This was an important effort because no-one had tried to focus on the general HCST domain in quite this broad way before - and it convinced SSHRC to fund this year's regional meetings in an effort to expand the resource base for the area. The first round of regional meetings again focussed on these questions as new folk joined the discussion. A reading of the 1979 report and the three regional reports will give a sense of the richness, complexity and importance of the field and of the kinds of participation it requires.

Already in this round of meetings, however, there appeared a developing awareness of the more practical problems which need to be discussed if SSHRC is to receive a rounded report. These latter, more practical, issues will undoubtedly occupy a large slice of next round's regional meetings. To aid that discussion, and to ensure that regional representatives come to the national meeting with as well defined (if

negotiable) positions as possible, let me sketch some of these issues as I presently see them. SSHRC's potential support might fall into any of three general areas, which I shall briefly and roughly label and define as follows:

FIELD CAPACITY EXPANSION :: Means to increase the numbers involved in the HCST field, or the quality of their skills and experiences relevant to HCST activity.
Examples: A programme of fellowships to provide inter-disciplinary training for discipline-based researchers; more regional discussion groups; national seminars on named problem areas; cross-disciplinary post-graduate scholarships; business, labour↔university secondments.

FIELD RESEARCH SUPPORT :: Monetary and/or administrative support for research projects.
Examples: Small group support to explore a new problem area; simulation run of a large research project to determine needed personnel (i.e. skills, information) and/or to 'de-bug' a methodology; large research grant to established individual or team to carry out well-defined project.

FIELD STRUCTURE SUPPORT :: Monetary and/or administrative support for infra-structure within the HCST field and between the HCST field and the society at large.
Examples: A national newspaper devoted to HCST issues; a research projects central network of researchers; a programme of community seminars, or radio addresses on HCST issues; a national HCST executive to organise peer review, or bi-annual conferences.

N.B. I have only offered examples of what could fall under each general area - do not let your imaginations or consciousnesses be constrained by them.

For each of these three areas a number of practical concerns arise, of which I list the following:

WIDTH :: What is the range of activities that should be included under each area? SSHRC has encouraged us to be innovative, to burst the constraints of usual academic research - so, what does the HCST really require for its healthy and conscientious development? Example: Why restrict seminars to research exploration, perhaps the field needs to develop educational seminars for politicians and civil servants.

ADMINISTRATION : Who should make the support decisions in each area and who should select these decision makers? Example: Use present Academic Panel of SSHRC or separate peer review process for research grant decisions? To whom would an HCST newspaper editor be responsible?

SPREAD :: How should support, assumed finite, be divided among the three areas and, within each area, among the spread of activities involved? Example: Should fellowships dominate the capacity expansion allocation or should on-going regional discussion groups receive at least 40%.

REGIONALISATION :: To what extent are regional differences important to take into account in the area and should the administration and support be then regionalised? Example: Should most fellowships be given on a regional basis, but major research grants be national?

FLEXIBILITY :: What processes, structures are there to ensure that each of the above decisions (i) remains responsive to changing needs and circumstances, hence is revisable, (ii) is able to innovate and to encourage the unusual and (where warranted) the currently unpopular, (iii) is able to resist domination by established, but more narrowly focussed, research groups. Example: How to choose relevant peers for a peer review process?

Putting these five issues together with the three concerns leads to fifteen questions on which SSHRC might be given guidance:

	FIELD CAPACITY EXPANSION	FIELD RESEARCH SUPPORT	FIELD STRUCTURE SUPPORT
WIDTH			
ADMINISTRATION			
SPREAD			
REGIONALISATION			
FLEXIBILITY			

Many of these issues arise in the regional reports, with more variations than have been mentioned here. It is not necessary that all of these questions be tackled at the next regional meeting by every regional group, nor are these the only relevant issues. What the HCST field is and how it should develop continue to be central issues that need as much clear refinement as possible - indeed, a view of what the HCST field is will clearly shape answers to many (or all) of these questions and should be made explicit in them. But I hope that the regional representatives will come to the national meeting sufficiently clearly instructed as to allow us to address these issues.

Alan Fox, SSHRC's reporting officer for this exercise and a constant source of support has agreed to attend all of the next round of regional meetings to answer questions etc. He has also offered to prepare some initial, personal comments on many of the fifteen questions outlined above, as a stimulus to discussion and you will recieve those prior to your group meeting.

The dates for the next round of regional meetings are as follows:

Atlantic - September 26-7. Ontario - September 12-14 Western - October 2-4

After this round of meetings brief reports will again be written, printed and distributed to all, so everyone should have a good idea of the basis for the national report. The national meeting is intended for late October, details soon. After the national meeting a report will be prepared and distributed to all, so that everyone will know this part of the basis on which SSHRC is deliberating. I have received many requests for SSHRC to make their process of deliberation on the report public and I further hope ways can be found to involve HCST members in development of SSHRC's response to it. We look forward to SSHRC's response to these requests.

Finally, I note that through the offices of SSHRC - and after many efforts on my part to form a Quebec regional group had failed to bear fruit - Jean-Claude Guédon of Montreal has been invited to form an independent discussion group, which may and hopefully will play some role in our overall process. We are awaiting now a statement of aims and invitees for this group and for a proposal concerning their relation to the national effort; it will be circulated to all when received. Meanwhile those in Quebec involved in 1979's preparatory studies have been invited to join either the Atlantic or Ontario groups if they wish.

On behalf of Terry Burrell, executive research assistant, and myself, I wish you all a good summer and look forward to exciting developments in the Fall.

ANNEX 3

Attendees, HCST National Meeting, St. Mary's, Ontario
October 31 to November 2, 1980

John Abrams
Department of Industrial
Engineering
University of Toronto
Toronto, Ontario M5S 1A1

Ed Abramson
Department of Sociology
University of Saskatchewan
Saskatoon, Saskatchewan

Michael Bayles, Director
Westminster Institute for
Ethics and Human Values
London, Ontario N6G 2M2

Rosemary Billings
National Action Committee on
the Status of Women
Suite 306
40 St. Clair Avenue East
Toronto, Ontario M4T 1M9

Terry Burrell
Victor & Burrell
Research and Consulting
72 Gothic Avenue
Toronto, Ontario M6P 2V9

Peter Dawson, Director
Tompkins Institute
College of Cape Breton
Sydney, Nova Scotia B1P 6L2

Leandre Desjardin, Doyen
Faculte des Sciences Sociales
Universite de Moncton
Moncton, Nouveau Brunswick E1A 3E9

Fred Knelman
Science & Human Affairs
Concordia University
1455 Maisonneuve Blvd. W.
Montreal Quebec H3G 1M8

John MacCormack
(Eastern Coordinator)
Institute of Human Values
Saint Mary's University
Halifax, Nova Scotia B3H 3O8

Alan Fox
Social Sciences & Humanities
Research Council
255 Albert Street
P. O. Box 1610
Ottawa, Ontario K1P 6G4

Barry Hoffmaster (Ontario Coordinator)
Department of Philosophy
University of Western Ontario
London, Ontario N6A 3K7

Cliff Hooker (National Coordinator)
Department of Philosophy
University of Newcastle
Newcastle, New South Wales
Australia 2308

Jose E. Igartua
Department des Sciences Humaines
Histoire
Universite du Quebec
930 est rue Jacques Cartier
Chicoutimi, Quebec G7H 2B1

Gordon Inglis
Department of Anthropology
Memorial University
St. John's, Newfoundland A1C 5S7

Ray Jackson (on leave from Science
Council of Canada)
208 Clemow Avenue
Ottawa, Ontario K1S 2B4

Don Kerr
Department of English
University of Saskatchewan
Saskatoon, Saskatchewan

Ted Schrecker
Research, New Democratic Party
Room 218, North Wing
Main Parliament Building
Queen's Park
Toronto, Ontario M7A 1A2

Patricia Sloan
Ministry of Industry and
Small Business Development
Government of British Columbia
Victoria, British Columbia V8V 1X4

Philip McShane
Department of Philosophy
Mount St. Vincent University
Halifax, Nova Scotia B3M 2J6

Heather Menzies
851 Forest Street
Ottawa, Ontario K2B 5T8

Douglas Norrie
Department of Mechanical Engineering
University of Calgary
Calgary, Alberta T2N 1N4

Sidney Pobihushchy
Department of Political Science
University of New Brunswick
Fredericton, New Brunswick

John Robinson
Department of Geography
University of Toronto
Toronto, Ontario

Frank Tester (Western Coordinator)
Kananaskis Centre
University of Calgary
Calgary, Alberta T2N 1N4

Ralph Torrie
Friends of the Earth
P. O. Box 569, Station "B"
Ottawa, Ontario

Bill Vanderburg
Room 2044, New College
University of Toronto
Toronto, Ontario M5S 1A1

Carl Ridd
Department of Religious Studies
University of Winnipeg
Winnipeg, Manitoba T3B 2E9

ATLANTIC REGION REPORT

FIRST MEETING

A Report on the Atlantic Region Workshop

In his opening remarks, John MacCormack discussed the human context in its Atlantic Canada setting. Although he stressed that HCST can be interpreted in global, national or regional terms, and that we should be as concerned to explore the wider dimensions of the problem as we are to examine the regional aspects,nevertheless he reminded the participants that Atlantic Canada, because of its historically established ethnic groups, each of which has it's "territory", constitutes a peculiarly interesting sociological and anthropological "laboratory" for the comparative study of the quality of life. He suggested that if we are to take the phrase "human context" seriously,it imposes upon us an obligation to develop a methodology for assessing that quality. For some time past we have tended to assume that the marriage between technology and the "bottom line" automatically produced a good society. Recently, however, we have been forced to reevaluate this position. We are beginning to see that the economic good itself is not necessarily served by the complete rationalization of production. We are aware too that technology tends to be power-enhancing and that in the absence of any competing criteria for evaluating its applications, it will tend to be the servant of political, military or economic power.

But to set up another criterion involves the notorious fact-value

gap and the alleged impossibility of closing it. And yet if this cannot be done, it is impossible to make the human context intelligible. The attitude of mind which sees mathematical correlation as the only basis of meaning, can support only quantified studies and although these can go far to clarify the "human context" they can never recreate it. What is needed in order to provide a critical approach to the problem are studies which employ both the interdisciplinary and comparative method and which link the humanities with the social and natural sciences. If we applied this methodology to the Atlantic region, we might well make contribution to the discussion that would have far-reaching repercussions.

STRATEGIC FUNDING

At the outset of the plenary session, following the first discussion groups, there was considerable criticism and skepticism with respect to the strategic funding policy in general and the HCST project in particular. Professor Dawson (Philosophy, College of Cape Breton) felt that since this was an exercise which would have the effect of involving us in strategic decisions we should tread very warily. Claremont (Sociology, Dalhousie) was critical of the neglect of the praxis dimension in the Hooker report and expressed uneasiness re the tendency for government departmental research to call the tune for academics to the extent that "these scholars must tailor their research proposals to priorities established by specific governmental departments." (Claremont, p. 4) Nevertheless he felt that the new institutional bases and alliances alluded to in the report might be important in creating countervailing power against this trend and

regretted that Hooker did not become more specific in this respect. MacCormack suggested that the group recognize the fact that the power disposed by the controllers of technology is so great and the problems so complex that an interdisciplinary and team approach is called for on both counts and that we are now obliged to use technology in order to cope with its effects. He also felt that it was highly unlikely that private funding would be found to support a type of research that would inevitably increase the tension between the disposers of this power and its critics.

The challenge is one of supporting strategic funding without being co-opted by it. The alternative is acquiescence in the status quo. Dawson agreed that it was indeed an important area for investigation and that a multi-disciplinary approach was required. Aucoin was, however, concerned that there was a danger that particular persons in the government bureaucracy and in the Canadian academic world in general had rather definite ideas as to the results that might be expected from an exploration of the HCST field and that this expectation might skew the results in advance. There was a necessity to take an open-ended approach with no intention to please particular people or interests with the results. Continued funding should not be seen to depend on particular findings.

HCST FIELD

The diffuse nature of the field made it difficult for many participants to grasp it as a unity. The alternate approach of examining the disparate elements also had its dangers. "Dividing in order to conquer, we are captured by divisions." (Sanderson, Philosophy, Saint Francis Xavier)

Sanderson also made the important point that because the whole problem area is dynamic rather than static, our images and models must have similar qualities and the exploration of the field calls for a kind of orchestration of diverse efforts.

Concern was expressed by some participants that the field was too big and that the project was too ambitious, that we seemed to be attempting to re-work the whole field of human knowledge from the vantage point of HCST. Others felt that an "activating principle" was in fact lacking and that what was required was a "thrust" to the field that Hooker seemed to be implying but not explicitly stating. Until this was made explicit, it was premature to talk of specific research projects. Still others argued that to structure the field more overtly would be to establish an "orientation"(direction) framework which would act as a kind of procrustean bed.

Inglis,(Anthropology, Memorial) while agreeing with Hooker on the necessity for an interdisciplinary attack on the HCST questioned his organizational conclusions. He doubted that it was necessary to have projects in this area guided by persons who have "themselves personally crossed disciplinary lines" and feared that such a course would only end in creating a new hierarchy and a new set of vested interests. He proposed instead that the SSHRC promote a deeper awareness of the HCST problem across the whole range of disciplines and injecting HCST concerns into all the granting programmes of the Council.

Woodfine (Economics, Saint Francis Xavier) wondered whether to-day's problems regarding HCST were fundamentally different and concluded that the speed of change and communication had indeed created a new situation, characterized by instability which was itself a function of the speed of change. Whereas in the past, Science and Technology had saved us from the

fate predicted by Malthus, they were now hurrying us onward in this very direction. D'Entremont (Political Science, Moncton) noted that Hooker had made mention of the cultural impact of oil exploration on the native people of the Beaufort Sea and suggested that there were similar problems with respect to the impact of technological change on the life style of Acadians in the Maritimes.

PROJECT ASSESSMENT

In general there was concern that the widespread acceptance of the methods associated with quantification would make it difficult for projects which employed the "soft" approach characteristic of the humanities, or which combined such methods with those of quantifying social science, to win the support of those making funding decisions.

What is needed in many areas connected with HCST, according to McShane (Philosophy, Mount Saint Vincent) is reflection on research rather than research itself and yet it is precisely this activity which is viewed as secondary and placed far down in the pecking order by funding agencies. Evans (Biology, Memorial) made a similar point. We need not more information but "better understanding of what we know now." (Evans, p. 3) When, he said, he himself stepped out of the "ivory tower" of pure research in order to assess the ecological results of various kinds of technology, his funding, heretofore assured, suddenly dried up. The decision makers were still in the ivory tower.

Monahan observed with respect to the problem of assessing the quality of life, that if we reduce this to the mere collecting of data as to what people's preferences are, we can expect generous funding. This is "genuine

research" because it conforms to a particular model. Other approaches which might be more meaningful necessarily depart from this model and suffer accordingly. Inglis (Anthropology, Memorial) agreed that this type of project which calls for an interdisciplinary approach is usually regarded by funding committees as peripheral to the discipline (Anthropology). The Council has to some extent recognized the importance of this problem and has set up some interdisciplinary funding committees. It was urged, however, that such committees be made up not of specialists within disciplines, but of persons who had themselves engaged in such activity.

Strawbridge (Psychology, Memorial) was concerned with the credibility of results gained from "soft" methodologies, apart from the funding problem itself, and despite the fact that the method might be the most appropriate one. The solution for this problem of skepticism lay in his view in "more widespread science and philosophy of science education."

Evans urged that funding agencies fund research into ecologically responsible technology so that if our system does collapse we will have a knowledge of basic survival skills such as: "how to grow food without pesticides, how to build good soil without fertilizers and how to design an aesthetic and healthy composting toilet." (Response pp. 5-6)

Cooter (Killam Fellow, Dalhousie) expressed a generally held opinion when he urged that the assessing process include a regional component, perhaps through regional research centres which would help to overcome the alienation of scholars in the face of the "remoteness of the closed door and non-appealable decision making on research proposals submitted to the SSHRC in Ottawa." This, he argued would

help to provide a "more 'human context' for both the funding and research".

ECONOMICS AND TECHNOLOGY

An opinion which appeared to be widely shared was that the link between technology and economies of scale was a key factor in the understanding and criticism of the social application of technology. Pobihushchy (Political Science, U.N.B.) argued that the application of large capital to New Brunswick farming had resulted in a very rapid depopulation of the rural areas without however, increasing the efficiency of potato production. The family farm was, he argued, actually more efficient than the agribusiness, despite propaganda to the contrary. Government policy was nevertheless, consistently favourable to agribusiness notwithstanding much lip service in favour of the maintenance of the family farm. Opinions differed as to whether the disappearance of the family farm was to be regretted. Woodfine (Economics, Saint Francis Xavier) argued that it was a mistake to look back upon the era of subsistence family farming as a golden age. The fact was that the people involved were, for the most part, on or below the poverty line. The central question here, which is deserving of some attention, is whether or not a completely laissez-faire attitude should be adopted towards urbanization or whether in fact the trend should be, as far as is feasible, reversed in favour of another type of population distribution. Nova Scotia, for example, has the highest percentage of its population in small towns of any Canadian province. Is there any relationship between this distribution and the quality of life in a society? Is there a point of diminishing returns where further urbanization means a net loss of efficiency and more than counter-balances any

cultural gains? It is important to recognize that such questions cannot be answered by quantification alone and such one-dimensional approaches will always be inconclusive on the central questions resulting in *laissez-faire* winning out by default.

Some expressed complete skepticism as to the possibility of making progress in the whole HCST area because of the power of the vested interests involved. Sheldon Curry (English literature, Saint Francis Xavier) wondered how it was possible to convince powerful people to consider the human context if they stood to lose money by that consideration. "Solving a problem costs money. Solving a big problem means somebody loses a lot of money. People who can lose a lot of money are powerful people. They won't let you solve problems at their expense." Woodfine (Economics, Saint Francis Xavier) was also pessimistic especially in view of the prevailing conservative trend in economic thought as exemplified by Milton Friedman in the United States. (Woodfine, 4) It was emphasized during one discussion that we must concentrate on the relationship between those who develop technology and those who utilize it, one speaker insisting that it must be seen as an instrument which permits some people to increase their degree of power over other people.

Others however saw technology in a more liberating light. Kierans (Engineering, Bell Institute and College of Cape Breton) argued that the spread of information means that the ordinary person is enabled to make decisions of a type that can place the corporate power brokers in great difficulties and cited the example of U.S. car-makers such as Chrysler as an example of the penalty that can be paid for ignoring the views of

of the ordinary citizen. Against this Woodfine argued that we must ask: who is controlling technology? One of the prime areas to be investigated, he thought, if real progress was to be made in this area, is the whole structure of power with respect to the development and use of technology.

MacCormack observed that in the absence of any firmly held criteria with respect to personal and social development political and economic power tend to move into the moral vacuum and they become virtually the sole determinants with respect both to development (research) and application of science and technology. At the best of times the creation of a developmental society involves struggle and tension but we need not be surprised if the contemporary divorce of knowledge and values provides no rival or countervailing power to the "bottom line" philosophy. Our problems with respect to the application of technology do not arise simply from capitalistic acquisitiveness (see Pobihushchy, 5; Cooter, 2) but from the fact that this operates in a virtual vacuum.

ECOLOGY AND ENERGY

The conflict between short range economic gain and the long range ecological good was emphasized by John Evans (Biology, Memorial). He pointed out that existing technologies had been developed with short-run economic gain in mind and because of this they are doing great harm to the biosphere. But ecological solutions and appropriate technology are unpopular and take a long time to be put into effect. The introduction of chemical rather than organic fertilizers has meant increased production of food at the price of the degradation of the soil which in turn is

fought by the application of more chemicals. The "double bind" is very much in effect with the cure producing more diseases.

Vernon Ireton (solar technology, UNB) emphasized the wastefulness of society with respect to energy use. We tend, he said, to concern ourselves with increasing supply whereas we should be more aware of the significance of waste. Studies which would tell us more about the economic application of energy are badly needed.

APPROPRIATE TECHNOLOGY

Although there is a great need for more research in the field of alternate and appropriate technology in the Atlantic region, most of the universities are not well equipped to carry out such research due to their size and, with some exceptions, lack of large scale graduate school facilities. More research would be possible, however, if funds were made available to provide released time to faculty members for these and related purposes.

One of the pressing reasons for research in this area arises from the spectre of technological unemployment which is already upon us as a result of the micro-chip revolution, and its results of which the word-processor is only one. Whether we can regard the recrudescence of cottage industry as a realistic possibility is a question, but recent developments in small scale energy technology indicates what can happen when goals are changed. To what extent, it was asked, can technology help the small fisherman and farmer? Is there a law of nature that dictates that such developments must always serve the "big battalions."?

MacCormack pointed out that we should be more aware of the ways in which technology can be used to multiply and reinforce human resources. Television, for example, could be used to enhance communications between Atlantic universities enabling the institutions of the region to gain some of the advantages of the multiversity while retaining the benefits of smaller institutions.

Kierans (Engineering, Bell Institute and College of Cape Breton) provided the workshop with some interesting examples of the application of technology to enhance the quality of life in Newfoundland. One of these is the mining of peat which is not only providing an important alternative energy resource but opening up new areas of good agricultural land in the mined areas. Another example was the development of underground cold storage for fish. This enables fish to be kept in cold storage for long periods at a very low energy cost and will substantially alter one of the aspects of the fishery economy.

Evans (Biology, Memorial) suggested that if the whole movement in the direction of alternate technology is not to be regarded as a kind of lunatic fringe activity it needs instruments through which the serious workers in the field would have an outlet. He strongly urged (Evans, 6) that a journal of alternative technology be founded.

INFORMATION ECONOMY

A number of negative effects which the centrally controlled Canadian information economy has on the Atlantic region were noted. Statistics

Canada's method of gathering statistics was cited as a case in point. Because no distinction was made between cash income and quality of life, a distorted and excessively negative image of life in the region is produced. Modern communications, e.g. television, the programs of which tend to be produced in central Canada, are increasingly providing residents of Atlantic Canada with their self-image which is inaccurate and stereotyped. It was pointed out that television provides a particularly interesting instance of the way in which technology acts as a multiplier and reinforcer of any given attitude and creates a situation in which a relatively tiny group of people can influence the lives of hundreds of millions. We are witnessing what might be termed the homogenization of world culture a situation in which "Dallas" is watched by everyone from Joe Batt's Arm to Zimbabwe. But if we asked whether this was part of a plot to subvert world culture the answer would certainly be in the negative. The long range effects are intended by no one and for that reason the phenomenon is all the more disturbing.

On a more optimistic note, Kierans (Engineering, Bell Institute and College of Cape Breton) argued that information retrieval systems now place the ordinary citizen in an unprecedented position of power with respect to rapid access to information. He himself recently employed the system to explore the question of oil spill liability and within two weeks was probably the best informed person in the Atlantic region on the subject. This access to information, he argued, provides very effective countervailing power to that of government and corporations and will be increasingly utilized by the ordinary citizen.

PHILOSOPHY, HUMAN VALUES

In general it was emphasized that there was great need for more thought and intellectual exchange in the HCST field, particularly in the region, and for the concomitant need for an agency which would further such interaction. On the other hand there was no enthusiasm for anything that could be called a regional or even national philosophical approach.

One of the pressing problems affecting the field was that of epistemology. Monahan (Philosophy, Saint Mary's) identified this problem as providing a basis for a project that would be well worth funding. MacCormack pointed out that without the humanities, "the human context" cannot be examined with any degree of intelligibility. Yet there are two problems in this area: one is convincing the quantifying social scientist that history, literature, philosophy and religion can be part of an interdisciplinary team without making an unacceptable sacrifice of objectivity; other is convincing the humanist that a contemporary problem is any concern of his in his capacity as a scholar. But both of these difficulties are related to the inadequate understanding, by scholars in all fields, of the character of the humane judgement as opposed to the personal prejudice.

It was pointed out the phrase "human context" implies some kind of opposition between the human good and the pursuit of science and the development of technology. The implication is that these activities are not self-justifying and that they should accommodate themselves in some way to the "human context". We are at the end of a three hundred year

effort to define and understand the human in the same terms by which we understand the material universe and this effort has resulted in the virtual disappearance of the word "human" from the academic lexicon. If we are to restore it and at the same time develop a critical social science, it is imperative that an epistemology be developed that will justify the interdisciplinary comparative approach and the situating of any problem in both the historical and cross-cultural context. It is this context that will supply the necessary degree of objectivity and permit us to make progress on questions relating to personal and societal development and enable us to develop a critique of culture. Without such a critique we cannot assess the quality of life and this in turn makes the assessment of technology impossible except in terms which are alien to the human.

An interesting discussion took place with respect to the role of literature in the assessment of the quality of Acadian life in New Brunswick. Are social indicators sufficient it was asked, or would the fictional work of a writer like Madame Maillet, recent winner of the Prix de Goncourt, be relevant? It was generally agreed that without an understanding of the art, music, literature and history of a people it was impossible to make any adequate judgements of the quality of life. But again the question was raised: how can we prevent such a project from degenerating into a subjective morass? This problem is perhaps best seen as that which every historian faces when he develops an interpretation of a particular event. Essentially he presents an argument based both on quantifiable and nonquantifiable evidence.

He employs a mode of discourse calculated to appeal to the understanding and which occupies a middle ground between purely private emotions and mathematical logic. It is this area of argument which has been devalued in modern theories of knowledge and it is this that must be restored. In this light, a project designed to assess the quality of Acadian life would present an argument rather than present a set of statistics designed to put an end to argument.

Sanderson (Philosophy, Saint Francis Xavier) supported this general position with the statement that no quantitative test exists for determining whether or not a man or woman has been depersonalized. He told the workshop that his experiences with an interdisciplinary project studying certain aspects of the Strait of Canso region had taught him that there was much more to understanding a community than correlating figures or preparing reports. Personal interaction was of the essence.

Kaill (Sociology, Dalhousie) explored the question from the point of view of one who had been a sociologist of religion. He had abandoned the field because of the realization that sociology did not deal with religion itself but only with the trivialities of religious exercise, practise and rituals. Because of this he had switched to criminology because it was much more susceptible to examination by the accepted methods of sociology. He questioned the use of such expressions by MacCormack as the "human need for truth, personhood or freedom" on the grounds that as a social scientist he could not talk about them. As for the supposed need to include other types of perception from fields

like art and literature, he felt that if we were to attempt to validate that argument we would be forced to do so by the accepted methods of the social scientist.

MacCormack responded that since the historian must reconstruct historical personalities, not to mention their particular internal states of feeling, in order to write history at all, the question of the reality and character of the historical judgement is one with which the social scientist must come to grips. He must either reject history as a serious intellectual activity or revise those theories of knowledge which confine him to the examination of external measurable phenomena and bar him from the consideration of internality or alternate modes of validation.

Sanderson insisted that poets, writers and artists had "an essential role to play in the perception of the social processes". (Sanderson, p. 2) They should become involved in the HCST field with more conventional academics despite the pain this might occasion for both sides. They can also play an important role in monitoring the language used in projects and reports so that jargon is kept under proper control.

Desjardins (Social Psychology, Moncton) felt that a serious problem for the social scientist lies in the dynamic character of the community he is studying and resultant lag between the study of a particular problem and the changes which take place while the problem is being studied. He suggested that social action must be often combined with research in order to overcome this problem.

The gap between the community and the social scientist was seen to be a serious problem by Billard (Eastern Fishermen's Federation). Alluding to a project in an Acadian community which involved the examination of telephone bills, Billard expressed the alienation of the community by quoting the people: "Here comes another group of experts, We've seen these people before and we know what we are going to give them; these crumbums."

He agreed with the suggestion that persons who were attempting to assess the quality of life of a community should themselves be familiar with the community and if possible members of it.

Strawbridge provided an interesting example (Strawbridge, p. 5) of the gap between the community and the expert and the dangers involved in ignoring experiential knowledge. When the harbour at Port aux Basques Newfoundland was being improved the engineers involved were deciding on the location of a breakwater. When an old fisherman heard of the proposed location he warned the engineers that if it was placed in that particular spot they would never get a big ferry into the harbour in a "nor'easter". Strawbridge had occasion to recall the story when, some years later, he sat for five hours"in a pitching CN ferry which could not get into the harbour because of a strong northeasterly wind."

The story has a philosophical point and relates to McShane's criticism of the contemporary"systematic exclusion " of experiential knowledge in favour of abstract frameworks and models. (McShane, p. 5)

REGIONAL ORGANIZATION

There appears to have been general agreement that some kind of

regional organization is called for if work in the HCST field is to go forward expeditiously.

Sanderson argued that external funding is necessary for such work since it is unlikely to be funded by provincial governments upon which the universities are greatly dependent. He suggested too that the Institute of Human Values might serve as the kind of umbrella institution which could fill the role of clearing house of information and general communication. The Institute could also sponsor regular symposia on various aspects of the field, and might also produce a regular newsletter to keep researchers abreast of developments.

There was general agreement on the necessity for an interdisciplinary approach to the problem. Claremont, (Sociology, Dalhousie) suggested that because of the emphasis on the human context in the field and the dangers of centralization, Hooker's suggestions for alternative institutions and alliances should be followed up. (Claremont, pp. 3-4) Roger Cooter (Killam Fellow, Dalhousie) strongly supported the collective, interdisciplinary approach to the field and regarded the Council's utilization of the Institute of Human Values as establishing a valuable precedent.

POSSIBLE RESEARCH PROJECTS IN THE HCST FIELD

The papers prepared for the workshop make several suggestions for specific research and study projects in the HCST field.

A number of different projects worth pursuing in the HCST field were discussed at the workshop as well; five of these are:

- The character of the interaction between government, science, technology and the corporate world;
- The relationship between economic development and ecological changes of an undesirable and ultimately self-defeating kind;
- The prospect of widespread technological unemployment arising from the development of the micro-chip;
- The development of an epistemology that would justify an inter-disciplinary strategy for the exploration of HCST;
- The development of a methodology for the assessment of the quality of life which would be applied to the comparative study of selected historical cultures of Atlantic Canada.

SUMMARY

1. STRATEGIC FUNDING

While there are still some lingering doubts in some minds as to the wisdom of SSHRC having a strategic funding program at all, some of the major difficulties were cleared up and the policy is now better understood. The concensus would seem to be: given that the strategic funding program exists, the HCST field is eminently worthy of receiving funding from it.

2. PROJECT ASSESSMENT PRIORITIES

The conceptualization of the HCST field should make the role of the humanities and the arts more explicit. There was general agreement as well on the necessity for an interdisciplinary approach. It is essential that funding be provided for projects which include the humanities, and which use "soft" as well as quantitative methods.

There was a widespread feeling that there should be regional imput at the project assessment stage.

3. SPECIFIC PROJECT AREAS

A. THE INTERACTION BETWEEN SCIENCE, TECHNOLOGY, GOVERNMENT AND THE CORPORATE WORLD

The opinion was frequently expressed that the interface between corporate power and technology was an area very well worth examining with the object of discovering to what extent technical developments are stimulated to serve economies of scale and the extent to which long range ecological and cultural considerations are taken into effect in corporate decision-making.

B. ECOLOGY AND ENERGY

Despite the widespread publicity given problems in this area there still exists a need to make the public more aware of the waste of natural resources which is being carried on in various areas, notably agriculture. A research project that would examine the cultural and ecological impact of contemporary agribusiness would seem to be well worthwhile.

C. APPROPRIATE TECHNOLOGY

The need for alternative ecologically sound technology was made clear. Less clear was how technology can be made to serve the small farmer and in-shore fisherman of the Atlantic region. This is also an area for further investigation.

D. INFORMATION ECONOMY

Insofar as this is a regional problem area it related to a feeling that the region was not well served by a centralized television system with insufficient feed-back from the region. A question for the future would be: will access

to information retrieval sources become more or less available to the average person in the future?

E. PHILOSOPHY, HUMAN VALUES

The main interest in this area centred on epistemology. If the HCST field is to be adequately and convincingly explored, we need a theory of knowledge that will justify the type of inter-disciplinary effort needed, and will also justify the development of a methodology for assessing the quality of life in a given society. Without such assessment no adequate assessment of technology seems possible.

4. REGIONAL ORGANIZATION

There appeared to be general agreement that a collective regional effort was called for and that some type of umbrella organization was needed, which could act as a clearing house of information, organize regular symposia, and assist in the formulation of research projects.

CONCLUSION

Subject to further revision in the September meeting of the workshop, it can be stated that a general consensus was reached in a number of significant areas.

The most serious doubts with respect to the strategic funding policy were cleared up and there was general agreement that the HCST was a highly significant area for interdisciplinary investigation. A regional focus for this effort was seen to be both practical and desirable and there was general support for some type of co-ordinating organization.

Attendees at SSHRC Workshop on

"THE HUMAN CONTEXT OF SCIENCE AND TECHNOLOGY"

Held at St. Mary's University, Halifax
May 17 & 18, 1980

Prof. Peter Aucoin	Dept. of Political Science Dalhousie University Halifax, N.S.
Mr. Allan Billard	Executive Director Eastern Fishermen's Federation Charlottetown, P.E.I.
Mr. Dan Brown	Vice-President (Planning) N.S. Power Corporation Halifax, N.S.
Mr. Terry Burrell	Victor & Burrell Research & Consulting Toronto, Ontario
Prof. Donald Clairmont	Dept. of Sociology Dalhousie University Halifax, N.S.
Dr. Roger Cooter	Killam Fellow Department of History Dalhousie University Halifax, N.S.
Prof. Sheldon Curry	Dept. of English St. Francis Xavier University Antigonish, N.S.
Prof. Peter Dawson	Director, Tompkins Institute College of Cape Breton Sydney, N.S.
Prof. Harley D'Entremont	Associate Dean Universite de Moncton Moncton, N.B.
Prof. Leandre Desjardins	Dean, Arts & Science Universite de Moncton Moncton, N.B.
Prof. John Evans	Dept. of Biology Memorial University St. John's, Newfoundland
Prof. Patricia Fitzgerald	Chairman, Dept. of Management Saint Mary's University Halifax, N.S.

Prof. Ernest Hayes	Dept. of Chemistry Acadia University Wolfville, N.S.
Ms. Susan Holtz	Ecology Action Centre Halifax, N.S.
Prof. David Hope-Simpson	Dept. of Geology St. Mary's University Halifax, N.S.
Prof. Gordon B. Inglis	Dept. of Anthropology Memorial University St. John's, Newfoundland
Prof. Verne M. Ireton	Dept. of Mechanical Engineering University of New Brunswick Fredericton, N.B.
Prof. Joseph Jabbra	Dept. of Political Science St. Mary's University Halifax, N.S.
Prof. Robert Kaill	Chairman, Dept. of Sociology Dalhousie University Halifax, N.S.
Prof. Thomas Kierans	The Bell Institute College of Cape Breton Sydney, N.S.
Prof. John MacCormack	Institute for Human Values St. Mary's University Halifax, N.S.
Prof. Charles MacDonald	College of Cape Breton Sydney, N.S.
Mr. Fred R. MacKinnon	Halifax, N.S.
Rev. Ralph McQuade	St. John, N.B.
Dr. Philip McShane	Dept. of Philosophy Mount St. Vincent University Halifax, N.S.
Prof. Sidney Pobihushchy	Dept. of Political Science University of New Brunswick Fredericton, N.B.

Prof. George Sanderson	Dept. of Philosophy St. Francis Xavier University Antigonish, N.S.
Prof. Jack Strawbridge	Dept. of Psychology Memorial University St. John's, Newfoundland
Prof. Leon Trakman	Dalhousie Law School Dalhousie University Halifax, N.S.
Dr. Barry Wheaton	Dept. of Religious Studies Mount St. Vincent University Halifax, N.S.
Prof. William Woodfine	Dept. of Economics St. Francis Xavier University Antigonish, N.S.
Prof. Arthur P. Monahan	Dept. of Philosophy St. Mary's University Halifax, N.S.

INVITEES TO SSHRC WORKSHOP ON "THE HUMAN CONTEXT OF SCIENCE AND TECHNOLOGY"
HELD AT SAINT MARY'S UNIVERSITY, HALIFAX, MAY 17 and 18, 1980

Mr. Paul Armstrong	c/o Ecology Action Centre, Halifax, N.S.
Dr. Stanley Armstrong	Dept. of Religious Studies, Saint Mary's University, Halifax, N.S. B3H 3C3
Mr. Don Arsenault	Bras D'Or Institute, c/o College of Cape Breton, Sydney, N.S. B1P 6L2
Prof. Peter Aucoin	Dept. of Political Science, Dalhousie University, Halifax, N.S.
Mr. Allan Billard	Executive Director, Eastern Fishermen's Federation, 179 Queen St., Charlottetown, P.E.I.
Prof. David Braybrooke	Dept. of Philosophy, Dalhousie University, Halifax, N.S.
Mr. Dan Brown	Vice-President (Planning), N.S. Power Corporation, P.O.Box 910, Halifax, N.S. B3J 2W5
Prof. Donald Clairmont	Dept. of Sociology, Dalhousie University, Halifax, N.S.
Prof. Sheldon Curry	Dept. of English, St. Francis Xavier University, Antigonish, N.S. BOH 1CO
Prof. Peter Dawson	Director, Tompkins Institute, College of Cape Breton, Sydney, N.S. B1P 6L2
Prof. Harley D'Entremont	Associate Dean, Université de Moncton, Moncton, N.B.
Prof. Leandre Desjardins	Dean of Arts and Science, Université de Moncton, Moncton, N.B.
Dr. Paul Erickson	Dept. of Anthropology, Saint Mary's University, Halifax, N.S. B3H 3C3
Prof. John Evans	Dept. of Biology, Memorial University, St. John's, Newfoundland A1C 5S7
Prof. Patricia Fitzgerald	Chairman, Dept. of Management, Saint Mary's University, Halifax, N.S. B3H 3C3
Prof. Ernest Hayes	Dept. of Chemistry, Acadia University, Wolfville, N.S. BOP 1XO
Ms. Susan Holtz	Ecology Action Centre, Halifax, N.S.
Prof. David Hope-Simpson	Dept. of Geology, Saint Mary's University, Halifax, N.S. B3H 3C3
Mr. Mike Gillis	c/o CBC Agriculture & Resources, Box 3000, Halifax, N.S. B3J 3E9

Prof. Gordon B. Inglis	Dept. of Anthropology, Memorial University, St. John's, Newfoundland, A1C 5S7
Prof. Verne M. Ireton	Dept. of Mechanical Engineering, University of New Brunswick, Fredericton, N.B.
Prof. Joseph Jabbra	Dept. of Political Science, Saint Mary's University, Halifax, N.S. B3H 3C3
Prof. Brian Joseph	Division of Development Science and Sociology, College of Cape Breton, Sydney, N.S.
Prof. Robert Kaill	Chairman, Dept. of Sociology, Dalhousie University, Halifax, N.S.
Prof. Thomas Kierans	The Bell Institute, c/o College of Cape Breton, Sydney, N.S. B1P 6L2
Prof. Charles MacDonald	College of Cape Breton, Sydney, N.S.
Prof. Michael MacDonald	Dept. of English, Mount Allison University, Sackville, N.B.
Mr. Fred. R. MacKinnon	1654 Walnut St., Halifax, N.S.
Mr. David Alexander MacLean	Deputy Minister, Dept. of Fisheries, Province of Nova Scotia, Halifax, N.S.
Rev. Ralph McQuade	St. John, New Brunswick
Dr. Philip McShane	Dept. of Philosophy, Mount St. Vincent University, Halifax, N.S. B3M 2J6
Prof. Sidney Pobihuschchy	Dept. of Political Science, University of New Brunswick, Fredericton, N.B.
Prof. George Sanderson	Dept. of Philosophy, St. Francis Xavier University, Antigonish, N.S. BOH 1CO
Dr. William Shaw	Senior Deputy Minister of Mines & Energy, 1690 Hollis St., Halifax, N.S.
Prof. Jack Strawbridge	Dept. of Psychology, Memorial University, St. John's, Newfoundland, A1C 5S7
Prof. William Trakman	Dalhousie Law School, Dalhousie University, Halifax, N.S.
Mr. Waldo Walsh	12 Murray St., Kentville, N.S.
Mr. Lyndon Watkins	1329 Dresden Row, Halifax, N.S.
Dr. Barry Wheaton	Dept. of Religious Studies, Mount St. Vincent University, Halifax, N.S. B3M 2J6
Prof. Richard Wills	Institute of Man and Resources, University of Prince Edward Island, Charlottetown, P.E.I.

Prof. William Woodfine	Dept. of Economics, St. Francis Xavier University, Antigonish, N.S. B0H 1C0
Prof. John Young	Dept. of Chemistry, Saint Mary's University, Halifax, N.S. B3H 3C3
Ms. Cathy Kuusisto	6204 Allen St., Halifax, N.S. B3L 1G6
Prof. Arthur P. Monahan	Dept. of Philosophy, Saint Mary's University, Halifax, N.S. B3H 3C3
Prof. Jacques Goulet	Dept. of Religious Studies, Mount St. Vincent University, Halifax, N.S. B3M 2J6
Prof. Greg McLeod	College of Cape Breton, Sydney, N.S. B1P 6L2

ONTARIO REGION REPORT

FIRST MEETING

Report on the First Meeting of the Ontario Regional Group, May 30 - June 2, 1980

The Human Context for Science and Technology

Many issues related to the definition and development of the HCST field and to the funding of research projects in this field were discussed at the first meeting of the Ontario Regional Group. For the purposes of this report, these issues will be organized into five sections: the characterization of the HCST field, the goals of the Ontario Regional Group, funding areas, research themes, and problems encountered by the Ontario Regional Group.

Three kinds of views are contained in this report. Most of it reflects the author's perception of the consensus of the Ontario Regional Group on issues. At some points, though, views of individual participants are cited directly or indirectly. In addition, where indicated, the author's own views are given.

I. The Characterization of the HCST Field

Two questions need to be asked about the HCST field: what is it and why is it important? Full initial answers to both questions are given in the Preliminary Report (PR) of the November, 1979 meeting. What seems to unite those interested in the HCST field is a shared recognition of the importance and pervasiveness of science and technology in contemporary life and a shared concern with the manifold problems generated by science and technology. (PR, p. 12) The immensity, complexity, and apparent intractability of these problems, and the historical watershed at which society now stands with respect to science and technology, point to the urgency of creating new tools and pursuing new approaches to handle these problems. (PR, pp. 7-11)

Continuing discussions of the nature and importance of the HCST field should not be forestalled. Because of the pressure of time, however, the Ontario Regional Group

was given the task of developing fairly specific, concrete proposals for research directions in the HCST area. Most of the meeting was devoted to specifying such research needs and problems. For the results of the Group's deliberations, see Section IV and Appendix H. Discussions of the nature of the HCST field inevitably arose, though. The Ontario Regional Group addressed this issue at some length, as well as the more practical question of why a strategic grants funding program is needed for this area.

A. The Nature of the HCST Field

Numerous suggestions as to what is distinctive about the HCST area were made. One participant summarized the concerns and motivation behind the movement to the HCST field as follows:

> I think the basic issue is that as scholarship and research is presently organized it is very difficult for those of us who have transdisciplinary interests and multi-disciplinary training to pursue those interests and produce creative work. Moreover, we are convinced that, as a result, more conventional and perhaps less adequate ways of interpreting reality go unchallenged. The most practical result is that the human community is not served as well as it might be by the application of its scientific knowledge. At the very least we are convinced that we are obligated to be self-critical of our own commitments and the relationship of them to the paradigms we adopt for learning at any given time and the consequences they may have for the wider community. This is the basic legitimation for our concern and for work in this area.

Another participant argued for a systems approach to the HCST field:

> If we are serious about the HCST field, we need both macro- and microlevel analysis. A system is more than the sum of its parts: you need to examine both the components <u>and</u> the network of interactions. We are very weak when it comes to the latter. For example: What is a society? What is the role technology and science (not its bits and pieces) play in it? These are the macrolevel questions that we do not sufficiently consider.... [T]he history of science shows that not even a narrow discipline can be effective if it does not have an underlying framework which does not simply summarize the findings of the many microlevel studies but which can transcend them to point to new and fruitful areas of investigation. HCST requires a <u>systems-kind</u> of approach in addition to the interdisciplinary and disciplinary approaches.

The social relevance of the HCST field also was emphasized. A significant aspect of research in this area is that the results should be relevant to debates about technology and technologies, their impact on individuals, and choices concerning living with them and legislation about them. This entails, it was suggested, that the social relevance of a research proposal must be made clear either by the researcher or someone who is good at doing this or who has been trained to do this. One might require that such a statement be part of the description of a research project. That is, funding would be given only if a research proposal contained a significance and ramifications statement and perhaps an indication of how the interpretation of results of the research would be communicated to the appropriate audiences.

From these suggestions and from the various characterizations of the field in the Preliminary Report, four practical implications emerged.

1. The focus should be on problems that a) are not currently being researched, or b) are notcurrently being researched from a certain perspective, or c) are of particular social importance or more in need of further research.
2. There must be an explicit recognition of the human impact of science and technology. This requires a critical attitude toward the assumption of the value neutrality of science and technology.
3. Research must be broadly based and must involve non-academics.
4. Many research projects will have to be transdisciplinary. Not all research in the HCST field need be transdisciplinary, however. An historical study of the human and social impact of the development and introduction of a particular technology, or a philosophical study of various conceptions of the relationship between man and nature, would fall in the HCST field yet could be carried out within a single discipline.

B. The Need for a Strategic Grants Program in the HCST Field

The HCST field is in certain respects not new; SSHRC is funding and has funded research projects that fall in this area. There are two main reasons for a program of strategic grants funding in the HCST field, however. One is to encourage more people and people from different backgrounds to do research in this area. The other is to allow problems and issues in the HCST field to be formulated from new perspectives and investigated with new approaches. Many research projects will have to be transdisciplinary. Current procedures and criteria used by SSHRC, however, make it difficult for unconventional or transdisciplinary research to be funded. The identification and recognition of the HCST as a universe of discourse (not a discipline) would promote these ends.

For another participant's views on both the nature of the HCST field and the reasons for strategic grants funding in this area, see Appendix G.

C. Implications for Funding

The features of the HCST field outlined in the preceding two sections imply certain changes in the traditional manner in which SSHRC funds research.

1. Funding may need to be provided to educate all those who might be involved in HCST research. This education could occur at several levels.
   a) Researchers may need to learn how to do transdisciplinary research.
   b) There may be a need for specially trained people who can perceive the human or values implications of a research proposal and can explain the potential significance of the research for public policy.
   c) Since the results of the research must be accessible to the general lay community as well as to policy-makers, people may need to be trained to communicate the outcomes of research and the human or values implications of outcomes to these audiences.

d) Those people in society who may be affected by science and technology would need to know of the existence of the HCST field, and about how they can propose research projects and be involved in the overall research effort.

2. Different criteria of assessment may be necessary for non-conventional or transdisciplinary projects. Prevailing, disciplinary-based criteria may not be applicable to projects that approach problems from a new perspective or that transcend disciplinary boundaries.

3. A different method for calculating the costs of research would need to be adopted. Transdisciplinary projects would have high travel costs, for example. To involve non-academics would require the payment of e.g. consulting fees or day-care expenses.

4. SSHRC must be willing to take a chance with new kinds of research. The research may be speculative, innovative, and non-conventional. It may question prevailing assumptions and values, and it may use new methodologies. The research will be risky in the sense that fewer projects in the HCST field could be expected to "pay off".

II. The Goals of the Ontario Regional Group

The objective of the initial November, 1979 Conference was stated in terms of assessing research priorities in the HCST field. In the edited volume of proceedings from that meeting, the objective is changed to evaluating strategic research needs in the HCST field. Three goals, related to these two statements of objective, have emerged for the Ontario Regional Group. These goals represent the author's own view and were not explicitly discussed at the May meeting.

The first goal is to construct a list of research needs, research problems, research themes, or research areas. This is proceeding at three levels. At the most

general level, broad themes or areas in the HCST field are being identified (see the four themes in Section IV). Within these themes, more specific research needs or problems are being formulated (see the examples for the themes in Section IV). At the most concrete level, more detailed projects that illustrate how research into these needs or problems could be done are being suggested (see some of the proposals in Appendix H).

The other two goals are related to the determination of research priorities in the HCST field. The general feeling is that it is undesirable on the one hand and impossible on the other hand to say that one research project is more important than another, or that research projects in one area are more important than research project in another area. Two substitutes for a statement of priorities have been suggested. One is an alternative peer review process for research proposals in the HCST field that would operate without substantive criteria for assessment of the proposals. The other is an alternative peer review process that would apply substantive criteria of assessment developed for the HCST field.

Both substitutes recognize that the existing peer review procedure in SSHRC that sends proposals to referees on a disciplinary basis needs to be modified to accommodate the broadly based, transdisciplinary, and non-conventional aspects of HCST research proposals. Non-academics should be involved in the peer selection process, for example. A special group of HCST reviewers needs to be created and either used exclusively or integrated with disciplinary reviewers for HCST proposals. One suggestion is that the review process should have two stages. A screening committee, composed of academics and non-academics, would solicit research projects, comment on them, sort them, and suggest referees. Then a review committee would make decisions about funding projects on the basis of reports from referees. Another suggestion is that the decision rule used by the review committee would need to be changed. A rule that required consensus or a majority in favor of a project might make it impossible

for extremely non-conventional or potentially threatening research to be funded. It should be possible, therefore, for research to be funded if a minority of the review committee strongly favors it.

In sum, then, the second and third goals are to develop a proposal for an alternative peer review mechanism for the HCST field and to determine whether substantive criteria of assessment should be part of the peer review process, and if so, to make a recommendation about what these criteria should be.

These three goals will provide the structure for the second meeting of the Ontario Regional Group. During the summer more detailed descriptions of proposed research projects will be obtained from members of the Group. Participants at the second meeting then will be asked to pretend they are members of a peer review committee and to assess these research proposals. The aims of this role-playing exercise are: (1) to develop a list of research themes, problems, needs, etc. in the HCST field; (2) to determine what kind of peer review process best suits the HCST field; and (3) to see whether substantive criteria of assessment emerge and therefore could be incorporated into the peer review process. The assignment of a fairly concrete task with fairly well-specified goals is intended to give more focus to the second meeting.

III. Funding Areas

Funding in the HCST field needs to occur in two areas: support activities and research projects. Research in the HCST field must be encouraged and supported through the identification of a community of people interested in the field and the development of an institutional structure that will allow these people to communicate, that will assist research, and that will inform people of the results of research. These support activities can be divided into those that are preparatory and those

that are continuing. Preparatory activities probably would be primarily educational. As mentioned in Section I, researchers may need to learn how to do good transdisciplinary research and referees may need to learn how to review transdisciplinary research proposals. One suggestion is that conferences or workshops be held to train researchers and referees.

Once research in the HCST field began in a coordinated, organized fashion, it would need to be supported and promoted on a continuing basis. Perhaps a clearinghouse for data and research should be created. A newsletter in the field was mentioned. Some kind of structure would need to be established, however, to assist the growth of the field.

General categories for research projects and more specific illustrations of these categories are given in the next section and in Appendix H. In addition, it was suggested that initial "scouting" or "survey" studies in an area should be funded. Such studies would review a field, identify the main problems in it, and recommend research projects for addressing those problems.

IV. Research Themes, Areas, Needs, Problems

The research needs or research problems suggested so far can be put in four broad categories. These categories represent the view of the author only; alternative frameworks for the field can be found in the Preliminary Report. Selected research needs or problems will be given to illustrate these categories. For some more detailed proposals for research projects see Appendix H.

1. Understanding Science and Technology

A. An area mentioned repeatedly as one deserving research is the fundamental assumptions that are behind society's view of science and technology. The Preliminary Report mentions the "concern ... with the uncovering of hidden assumptions, biases,

limitations and other human 'traps' which might lie in the very form of the enterprise itself." (p. 19) Robinson raises this issue in his discussion of "reflexive analysis" (Appendix C, p. 2) and shows how such fundamental presuppositions and assumptions have practical implications for the energy debate (pp. 7-8).

Torgerson raises another aspect of the same issue. He first mentions the need to investigate "the relationship of technical form (including the design of both specific technologies and infrastructure) with socio-political form" (Appendix A, p. 2) and then characterizes the issue of the relationship between world views and technological development as "an aspect of the broader question of the relationship between technical form and socio-political form." (p. 10)

B. Is there a "technological imperative" in general or in specific areas? Brunk and Regehr raise this possibility in their discussion of Canadian military policy. They ask, "Do developments in military technology guide defence policy, rather than policy objectives guiding technological innovation?" (Appendix D, p. 3)

The same kind of question can be raised with respect to health care. To what extent does the existence of sophisticated medical technology (e.g. respirators, CAT scanners) determine fundamental policy decisions, including decisions about the allocation of resources? To what extent is the prevailing orientation toward acute care, as opposed to chronic care and preventative medicine, a function of high technology medicine?

C. An investigation of various typologies for technology would advance our understanding of alternative types of technological development. Lovins' controversial notion of "hard" and "soft" energy paths can be viewed as an elementary typology which contrasts two qualitatively different patterns of technological development that could be chosen as policy goals. Lovins focuses on energy, but Hancock applies this

typology to health care (see Appendix E.) Can the typology be extended to other fields, e.g., housing, agriculture, architecture, or transportation?

A critical assessment of the typology also is in order. Does it make sense to limit it to two types, or is this simply a good polemical device? Are these two types polar extremes with identifiable variations falling between them? Or are there variations that fall outside the continuum framed by these extremes? Such research would be more than conceptual; it also would require investigations of the history of the relevant fields of technology and of the current "state of the art" in these fields. A transdisciplinary approach would be most suitable.

D. Research into how people understand or conceive of science and technology would provide insight into the role of both in our culture. How do science and technology become part of our societal values or norms? One way to investigate this is through the portrayal of science and technology in the mass media. How, for example, are the role of the scientist, the role of the technologist, and the role of machines presented in children's literature, television, and movies?

Another project could be the investigation of the images of energy technology in popular culture. Which energy technolgies, for example, coal, nuclear, wind, solar, oil, are given particular emphasis and why? Possible sources could include radio, television, newspapers, promotional literature, and science fiction. An historical analysis again could be done because it would be important to know the roots of the imagery being employed in current energy debates.

2. The Human Impact of Science and Technology

Research projects in this category could investigate the impact of science and technology in general on society and culture, or could examine how particular technologies impinge upon the lives of groups of people or individuals. Brunk and Regehr provide examples of questions that might be asked at the more general level with

respect to military technology: "what is the impact of spending on military equipment upon technological innovation in civilian industry?" and "is ... military production financed by the draining of capital away from civilian and social service sectors of the economy?" (Appendix D, p. 3)

An example of a more specific issue is an investigation of the impact of the home computer upon children. How would home computers affect the education of children and the proportion of time they spend at work and leisure? Would there be a difference by social class? Available software packages would influence values just as textbooks now do. How should such software be designed? How would social stratification be affected if only the affluent can own home computers? Again, such a project invites a transdisciplinary approach. Among the disciplines involved would be computer science, education, sociology, psychology, and communications.

The impact of technologies upon such fundamental social units as the family and the household needs to be examined. How will traditional household tasks be changed by new technologies? What are the implications of everyone having an office in the home on, for example, transportation, housing, and recreational services? How will the family be affected by such changes?

Similar questions can be raised for any technology. The common theme, however, is how a given technology affects human beings. In what ways does it benefit them, and in what ways does it harm them? And what is the distribution within society of "costs", or harms, and of benefits?

3. Public Policy and Science and Technology

Much more needs to be known about the relationship between science and technology and the formation of public policy. There are several kinds of issues here.

A. Policy decisions regarding science and technology are made in a political setting. But exactly how does the policy process work? As Schrecker points out in his discussion of energy policy, "many ... critiques involve an implicit (sometimes

explicit) conception of the policy process and of governments as neutral mechanisms or arbiters, responsive (if in a sluggish way) to the weight of superior information or argument." (Appendix B, p. 1) How accurate is this descriptive model of the policy process? The practical consequences of an understanding of the policy process are enormous when one sees, as Schrecker points out, how a policy issue can be framed by manipulating politically sensitive variables such as the definition of risk and by controlling information, (p. 5) Moreover, Schrecker notes how a conception of politics and the policy process can impose constraints on policy choices. Is a choice between "hard" and "soft" energy paths possible given a policy process in which decisions are made incrementally or by "muddling through"? (pp. 6-7) And Robinson notes the conservative bias that is built into forecasting, a prevailing technique for policy analysis. (Appendix C, p. 4) So a much better understanding of the policy process is required to see how the assumptions inherent in the process and the actual operation of the process constrain and determine policy outcomes.

B. Research also needs to be done into the normative side of the policy process. One needs to know not only how the policy process as a matter of fact works, but also how it should work. How should society make fundamental policy choices involving science and technology? In particular, what role should the public play in such choices? Robinson raises this question with respect to the energy debate. To what extent are the major issues in the energy debate "technical" issues that should be decided by experts, and to what extent should public participation in the energy debate be encouraged? (Appendix C, pp. 6-7)

C. The plausibility of alternative, better approaches to policy formation depends upon the development of alternative normative models of the policy process and alternative tools for policy analysis. Schrecker recommends such a pragmatically oriented approach when he reminds us that "the creation of new dimensions is aided

just as much by the articulation of concrete and coherent alternatives for the future as by refinements of our theoretical and empirical understanding of how ... policy is developed." (Appendix B, p. 8) Thus he calls for substantive exercises in "scenario-building" and examinations of the institutional changes that new approaches to policy-making would require. Along the same lines, Robinson points out the relationship between fundamental assumptions about the nature of science, technology, and society and the techniques used for policy analysis (Appendix C, p. 8), and he recommends research into alternative techniques, for example, backcasting, that rest on alternative sets of presuppositions. (Appendix C, p. 10)

The role of foundational research into areas such as moral, political, and social philosophy should not be ignored when public policy is being considered. Torgerson points out how work in intellectual history and in sociology of knowledge is relevant to understanding the relationship between ethics and "social technology," and he suggests that a changing conception of the role of reason might accord reason a place in the determination of the ends of public policy. (Appendix A, pp. 3-4) He also notes how the debate over public participation in decision-making concerning "technical" issues is tied to a certain view about the "proper" role of reason. (Appendix A, p. 4)

4. Assessing Science and Technology

The assumptions inherent in such tools as technology assessment, social impact assessment, and environmental assessment, and the limitations of these tools need to be recognized. As well, alternative tools need to be developed that will fit alternative models of policy-making. To take an example mentioned above, what indicators or what measures should be used to assess the technological dependence of the household? What information could be derived from these meausures, and how could this information be used? Would the information be neutral in the sense that it would be equally useful (or useless) regardless of the model for policy-making that was employed? Or are

particular assessment techniques connected to particular models of policy-making?

The fundamental questions here are: what kinds of information does one want about the impact of science and technology on human beings, how can this information be obtained, and how can this information be incorporated into the policy-making process? An important related question concerns access to this information. How can this information be disseminated to those to whom it is relevant, foremost of whom, of course, are those whose lives are affected by the technology in question.

One participant developed an alternative list of themes in the HCST field:

> There are several themes or questions which arise with respect to science and technology in many areas. Among these are the following.
> (1) Does technique or technology determine policy rather than independently established policy goals determine the technology used?
> (2) Does the conception of rationality in science and technology exclude other forms of thought (kinds of rationality) and values, etc.?
> (3) Does science and especially technology depersonalize people and interactions? Examples might be assembly line production, television viewing, and medical technology (tubes, etc. for dying patients).
> (4) How are the benefits and costs, financial and otherwise, distributed among the population by technologies?
> (5) Low, decentralized, flexible technologies (soft) versus high, centralized, less flexible technologies (hard). Is one preferable to the other? Why? In what contexts?
> (6) Can one determine appropriate attitudes toward risk? For nuclear safety, food additives, automobile safety, occupational safety?
> (7) What are the effects of institutional structures on science and technology and vice versa? Among topics to be considered here are the structures of professions - recruitment, training, etc.

These statements of categories and themes are intended only to provide a starting-point for subsequent discussions of research directions in the HCST area and of how these might be organized.

V. Concerns About the Ontario Regional Group

Several worries about the composition and work of the Ontario Regional Group were expressed. Numerous disciplines relevant to the HCST field were not represented

at the first meeting, for example, history, anthropology, social psychology, and literature. Even more important, though, was the absence of non-academics. There were no representatives of labor or business, for instance, and there was no one who has direct experience with the application and impact of technology, for example, an engineer, physician, psychiatrist, or architect. In addition, the number of women in the Group needs to increase.

Non-academics need to be involved, not only for the perspectives they can bring at this stage, but also to help clarify the roles that non-academics can play in the future. In Section II it was pointed out that non-academics must be involved in the peer evaluation process. But in what other ways can non-academics participate? How could they suggest problems that need to be researched and be involved in the design of the research and the research itself? How can they be apprised of the results of research that are relevant to their lives? The academics in the Group realize that it is essential that non-academics be involved, but by themselves they are incapable of discovering all the forms that this involvement might take.

Finally, concern was expressed that the Group never addressed substantive issues of values, morality, and ethics. Such issues are inescapable when one is considering the human impact of science and technology. As one participant noted, research in the HCST field needs to raise the question, "Is it right or wrong to do this?" How questions of values and morality will be handled in the HCST field has not been addressed so far.

Barry Hoffmaster
London, Ontario

June 17, 1980

Suggested Research Projects

The following suggestions are based on rough notes submitted to the author (B.H.) at the end of the May meeting.

A. W.H. Vanderburg

Research Topics or Rather an STS Algorithm

1. Foundational Work

Study of the network of interactions between the components, substructures and institutions of technology, science and society. Build further models of interactions between STS. STS as a system: what are its basic structures, dynamics, feedback, etc.?

2. Transdisciplinary studies of particular facets (medicine, energy, military, computers, etc.)

Apply STS systems model to examine effects the remainder of the system has on these components and then model internal dynamics of these components.

I have worked out No. 1 and teach it to my students who then are asked to do a type 2 study. I have had very good essays on topics like:

S and T and: religion, feminist movements, family, interpersonal relations and mental health, work and leisure interactions, democracy, socialism, law, police, music, multinationals, state, environmental damage, energy, etc.

Most of these essays are better than much of what I heard at the conference in terms of a basis from which to start research because they identify the network of interrelationships that need to be examined to further develop the general STS model.

3. STS and education

See my paper on engineering education "A Blueprint for the Engineering Curriculum," Proceedings 2nd Canadian Engineering Education Conference (to appear shortly).

B. John Robinson

4. Energy Framework Analysis

The purpose of this project is to determine whether the way particular energy policy issues are defined and analyzed systematically biases the kinds of conclusions and policy recommendations reached. This would be done by analyzing the manner in which the main federal regulatory agency, the National Energy Board, structures its activities in making regulatory decisions and giving policy advice.

At present energy policy issues tend to be analyzed in terms of particular definitions of the "energy problem" and certain standard analytic techniques (e.g.

supply and demand forecasting; macro-economic impact analysis, etc.) Recent challenges to energy policy decisions often implicitly challenge these methods and definitions. There is little understanding as yet, however, whether and to what extent the types of conclusions reached are determined by these factors, largely because of a pervasive belief that methods of analysis are epistemologically and ethically neutral. The lack of concern with or awareness of such issues therefore reflects a prevalent view of the role of "scientific" analysis in public policy issues.

This study would be undertaken by means of a detailed analysis of the organizational structure, statutory mandate, and rule-making decisions of the NEB in the context of the kinds of regulatory decisions and advisory reports they have produced. Considerable familiarity with Canadian energy issues, the nature of government decision-making and the day-to-day activities and especially attitudes of the Board would be useful attributes for the researchers involved as well as understanding of the basic presuppositions and approaches of different intervenors.

5. Energy Backcasting

The purpose of this project is to determine whether energy backcasting techniques offer a useful means of resolving some of the problems involved in using supply and demand forecasts to determine the need for specific energy projects. A description of the problems presented by this use of forecasting would be followed by a theoretical elaboration of backcasting as a technique and an examination of the degree to which this technique addresses these problems.

The use of supply and demand forecasting tends: (a) to reinforce a status quo approach to energy policy-making; (b) to discriminate against new (i.e. unconventional) technologies and proposals; (c) to perpetuate existing trends; (d) to permit decision-making to appear to be ethically neutral; (e) to allow decision-making to operate under a cloak of spurious scientific objectivity; and (f) to obscure the degree to which the future is created by present decisions. For a brief defense of this argument, see pp. 3-6 of my submission to this regional meeting: "Energy and the HCST" (Appendix C). Backcasting, which involves the explicit choice of alternative social "end-points", which is not limited to "most likely" futures, and which requires the analysis of the possibility and implications of getting to these end-points from the present, appears to offer the potential of overcoming some of these problems. As yet, however, the technique itself and its implications for these issues is almost wholly unexamined, though it is being increasingly used in energy policy analysis. It is therefore necessary to elaborate this approach to policy analysis in sufficient detail to allow its implications to be examined. Familiarity with quantitative analysis, with the literature on forecasting, and with the interrelationships between social, political and economic structure and energy policy would be desirable attributes of the analysts.

6. General Research Questions

To what extent do scientists' views of the nature/purpose of scientific knowledge influence the type of scientific development that occurs, i.e. to what extent do "radical" scientists investigate different (kinds of) problems and come to different kinds of conclusions?

C. Ted Schrecker

7. Canadian federal energy policy: the "unequal structure of representation"

Essentially what is proposed is a class analysis of the structures of energy decision-making at the federal level similar to that developed by R. Mahon in the article to which I referred in my background memo (Appendix B). This has not, as far as I am aware, been done in Canada. Its particular importance in the context of the HCST project is as part of a "proliferation of perspectives" approach to understanding energy policy, policy decisions, and non-decisions.

Study should be done by a political scientist or sociologist with both a sympathy for Marxist-oriented policy analysis and an understanding of energy policy issues. An ideal two-person project. Would involve basically the writing of a monograph, discussion paper or long article.

8. Study Resource Guides: (1) food technology, (2) pharmaceutical industry

Resource guides for people outside (or perhaps inside) the academic community wishing to do research related to:

(1) food technology (additives, synthetic foods, food processing)
(2) pharmaceutical industry in Canada (perhaps this could function as a preparatory stage to M. Bayles' proposal on pharmaceutical industry - see number 15 in this appendix.

Each guide would include a discussion paper outlining some of the research/policy issues involved in consideration of that particular range of technologies, and technological decisions. It would be followed by a bibliography (possibly annotated), list of contact people and organizations, etc.

Important because these are areas about which very little is known in a systematic way in Canada, yet these are industries whose technological decisions affect every Canadian (in the case of food technology) or a significant minority, if not a majority (the pharmaceutical industry). There is abundant suggestive evidence in the case of the food industry that return on investment has been virtually the only criterion of technological assessment.

Important, also, because the publication of such guides after having funded their preparation would constitute an active intervention by SSHRC in a situation characterized by inadequate and inaccessible scientific/technological information. This is vastly more worthwhile, from the point of view of constituencies which have been denied access to research and to the setting of priorities for research, than simply producing a study which concludes: "Oh my. Here are a host of technologies with potentially disastrous health/social structure impacts which have hardly even been assessed, and very few people have the information necessary to begin that assessment process. Now wouldn't it be nice if someone did something about that??"

9. Food and Food Technology: Issues in Technology Development and Assessment

The resource guide on food technology could be the first preliminary stage of a major research focus on food and food technology. (I am indebted for most of

this idea to Ray Jackson.) Possible foci or topics for specific projects within the study:

- history of food additives technology
- analysis of reasons for decisions in case of specific additives: original decision to develop/marketing/purpose of specific additives
- structure of the food processing (and food additive) industry - who are major manufacturers/users? Universities as research infra-structure?
- implications of increasing synthesization and alteration of food products for agriculture (looking backward in the process) and individual self-reliance (looking forward)
- myth of the informed consumer: is the idea of a perfectly-informed consumer even hypothetically credible? Failing that, role of regulatory process
- additive regulation in Canada: implicit and explicit presuppositons ... comparison to level/structure of regulation in other jurisdictions?

One could go on and on. The importance of this project in the HCST context is that it represents an attempt to assess a technology (or, really, a set of technologies) whose impact is well-nigh universal, which have historically been assessed almost exclusively in terms of financial benefits to the proponents, and which are much more productively examined in a problem-oriented, non-disciplinary framework than in any traditional discipline (if any of the traditional disciplines were interested, which they've shown no sign of being.)

The background of the people undertaking the project, above and beyond fairly basic research skills, is not nearly as important as their commitment to the importance of the thing. Again, the aforementioned resource guide should be a first step, showing people at least what <u>some</u> of the conceptual issues are, and where a lot of the "must reading" material is located.

10. <u>Case studies: politics and economics of consumer product development</u> (see also as a complementary project the suggestion by M. Bayles on study of the use of social science techniques in the promotion and marketing of consumer products - see number 16 in this appendix)

This is a range of technological developments which has hardly ever been assessed except as with food technologies on the basis of financial return to the proponent (<u>cf</u>. Joseph Coates' example of the Polaroid SX-70 Land camera, which reportedly cost a third of a billion dollars to develop). Who <u>needs</u> or wants such technologies? What do we mean by "need" in this context? Are such needs/wants spontaneously generated - i.e. is it in the nature of <u>homo sapiens</u> to want instant-picture cameras, petroleum-based garbage bags, throwaway ballpoint pens, etc. etc.

The range of such technological case studies is really limited only by the sensitivity of the researcher. Some possible criteria for selecting interesting case studies:

- involve a sizable budget for r & d
- do not involve a demonstrable prior need
- involve sizable "marketing efforts" on the part of proponents of the technology

Some pertinent questions: what was the decision-making process resulting in the decision to develop and market? To what extent did it rely on the state to assist development? How intensive was the marketing effort to create/structure/mediate the "need" for the technology? What are the adverse environmental/health impacts? On whom do they fall - i.e. on users, on non-users, on future generations (through consumption of non-renewable resources)?

Again, the "qualifications" of people undertaking this sort of project are not as important as their commitment to it. Case studies could involve a number of people from divergent disciplinary backgrounds, or just one person with no discernible background. Importance is simply that no one is doing/funding study of how the technologies we live with and around every day came about, the effect being a widespread mystification of technological development and "progress" as something that "just happens". These case studies should be an exercise in the demystification of technology.

11. Nuclear electricity: legislative and advisory responses

Study of legislators' responses to the fundamental theoretical/interpretative issues involved in nuclear electric generation; assessment of need for the technology/characteristics of the technology.

A two-phase kind of study, involving (a) an individualistic (the term "subjective" isn't very useful in this context) assessment of what the major issues are, and (b) analysis of legislators' responses on the basis of reading transcripts of legislative questions, debates, committee hearings (I am thinking in particular of the Ontario Legislature Select Committee on Hydro Affairs).

Since researchers from different backgrounds will have different assessments of the "real" issues, it might be worthwhile to set up a symposium or collection of commentaries based on the same set of raw data. Importance: obvious, and obvious in the HCST context because if anything is interdisciplinary or transdisciplinary, this is. Danger is that project could extend to all aspects of energy policy - would have to be guarded against by keeping subject matter strictly limited to how the legislators in question view the issue and what that reveals about their assumptions on energy policy, risk assessment, etc. without trying to undertake evaluation of the assumptions themselves.

12. The Political Economy of Energy Policy in Canada: a collection of viewpoints

Differs from the others in that it's much more a product-oriented proposal, involving funding for editing/solicitation of material, perhaps partial subvention for publication. Advanced on the basis that it would be a damned interesting book to read, would tell us a lot about how the energy policies that shape our future are actually being made. Ideally suited for the HCST framework: it's problem- (or at least issue-) oriented, interdisciplinary, deals with the social impacts (and influences) of science and technology, and the SSHRC "presence" would result in something concrete (i.e., the publication of the volume) happening that in all probability would not otherwise do so.

Project #7 (above) could be included; so could essays and studies addressing several of the questions suggested in my background memo on energy issues (Appendix B).

D. Terry Burrell

13. <u>Alternative Approaches to Dealing with the Dislocation and Other Negative Consequences Associated with Acceptance or Rejection of a Technology</u>:

This is a project which would develop and scrutinize the implications of an approach different to the one we currently have for identifying and compensating for the decision to accept, reject (or accept with conditions) particular technologies. The project would examine current practice in dealing with the negative impacts of technological change, drawing out the value underpinnings of this practice (e.g. that individuals should be primarily responsible for dealing with the consequences of change; only in very special circumstances should society as a whole take responsibility and then basically in recognition of perhaps some retraining).

The project then would develop an alternative approach, one which would take as its point of departure the recognition of the necessity for a broader, social responsibility for decisions which are explicitly (or implicitly) social rather than individual. For example, the explicit, perhaps governmental, rejection of one technology - e.g. nuclear power - in favor of another. Given that some social responsibility should be taken for these negative impacts on particular groups or individuals, how much responsibility (monetary, compensation, alternative employment, other?), under what conditions, and how should it be administered? What are the economic, institutional and political implications of this for our current approach?

Why should the research be done?

A major stumbling block to effecting important decisions to reject (or accept) technologies is that particular groups will be (or perceive that they will be) negatively affected by the decision. These groups and individuals, under current practice, are almost inevitably forced to bear these impacts/costs themselves. Consequently, there is understandable resistance on the part of the groups negatively affected.

It would be useful to investigate the possibilities of "compensation" schemes - whatever alternatives exist which can address these problems.

This research and the HCST field

- deals with the problems associated with the important attempt of society to take some conscious control over the processes of adopting technology
- clearly a key problem for the impact of technology on society
- important policy implications

Results will be useful to those groups affected by change and give a concrete example of how things might be different

- for policy makers: an alternative approach, one which should be considered in formulating a coherent approach to technology assessment

Approach

steps:

a) Describe and draw out value implications of current practice
b) Explore and develop an alternative approach which would acknowledge social responsibilities
c) Elucidate how such an alternative might actually be pursued - a concrete case study - e.g. microprocessing technology in the machine tool industry, nuclear technology

What questions/issues would have to be addressed

- Is it possible to compensate at all?
- How to identify negative impacts and negatively affected people?
- What sort of principles should be used (moral? legal?)?
- What kind of compensation?
  - money?
  - job?
  - other?
- How to operationalize?
  - negative impact statement required, how to identify who should be be compensated
- Institutional Implications?
  - Legal
  - Political
  - Economic

Who should be involved

Someone knowledgeable about:

- Philosophical ethics
- Legal principles
- Economic approach
- 'Practical' sense (to bounce ideas off)
- Institutional side: someone to help formulate procedure, instructional bodies, etc.
- Socio/Economic impact assessment
  - for case study

E. Conrad Brunk

14. <u>The Impact of Military Technology Development Upon Foreign and Domestic Politics and Economics</u>

I. General Issues

One of the general themes identified by the Regional Group meeting as central to the HCST field was the question of how technologies of different types control or influence public policy decisions, either through value assumptions implicit in the technologies, or developmental dynamics, or "imperatives" of the technologies themselves.

Given the significant portion of North American research and development activity devoted to military-related technologies (some economists estimate this as high as fifty per cent), there is good reason to suspect that there is a significant impact from this technology upon our social and political life. It would be especially important to consider the extent to which intrinsic values of this technology influence policy decisions in the area of defence, export policy, and economic or industrial development.

This question is of special importance in Canada, given that Canadian participation in North American military production is concentrated heavily in the very "high" technologies (e.g. electronics, computer, aerospace).

II. Specific Research Problems

1. How does the "tooling up" of an industry to manufacture a military product affect the general direction of industrial development in the country? Are there dynamics intrinsic in the design of a military product (e.g., design dictated by functional considerations other than market and cost-efficient production considerations), and the marketing of the military product (e.g., "cost-plus" contracts) which make it especially difficult to "re-tool" or convert that industry to production of non-military consumer goods?

   If conversion to non-military production by industry is especially problematic, how does this factor influence public commitment to the "value" of defence spending and the marketing of arms to other nations? For example:

   a. How does the "need" to keep the arms industry healthy (avoiding lay-offs and factory shutdowns) influence a country's perception of its own security needs? Is the decision to purchase equipment for the armed forces dictated by products most congenial to existing industrial capacity, or by realistic assessment of actual security needs? Was the recent purchase of the F-18A fighter plane by Canada consistent with Canada's stated security objectives, or was it dictated by other, incommensurate considerations of "industrial benefit"?

   b. To what extent is defence policy itself influenced by technology rather than vice-versa? Does policy determine the technologies developed and equipment produced, or does technological capacity determine defence policy (i.e. what counts as "security")?

   c. To what extent are disarmament and arms control initiatives complicated and blunted by the pressures on the economy of arms producer nations like Canada generated by the existing military technologies and industrial capacities? Can arms exports be curtailed and arms embargos imposed if markets for these arms are "essential" to the economy?

   d. Is technological innovation in the civilian sector stymied by concentration of R and D in the military sector?

2. What is the impact of the export of arms technologies upon the economic and political development of recipient nations, especially the less developed nations of the third world? Does it commit these

nations to the development of infrastructures necessary to maintain relatively high technologies which are "out of scale" (e.g. centralization of energy production, hence nuclear power as in Phillippines)? What are the human consequences of recovering payment for raw material exports in the form of weapons rather than "productive" agricultural and industrial technologies?

III. Methodologies for conducting this research

The problems identified above clearly involve considerations which impinge upon a variety of academic disciplines and non-academic professions. They involve matters of economics, strategic studies, political economy, international development, energy planning, business and labour interests, and military science. For some of the problems mentioned, a team of researchers from several of these sectors would be feasible and desirable. For others a wide consultative effort by the researcher would be required and perhaps sufficient.

Research into these kinds of problems is often carried out within the narrow confines of a particular discipline and a specific model or method within that method. For example, issues surrounding the problem of arms proliferation and arms control are defined as a problem in International Relations (IR) or Strategic Studies. The problem is viewed in isolation from the larger economic and technological context and without questioning the strategic doctrines and value assumptions which prevail in these disciplines. This means that applications for funding of more broadly-based projects, which include consideration of wider issues, tend to be viewed as poorly diagnosed or overly ambitious by referees working within only one of the relevant disciplines.

F. Michael Bayles

15. <u>Pharmaceuticals</u>

1. Worthy of study because

   a) instance of use of science which has undoubtedly been of tremendous human benefit
   b) has created certain kinds of problems, such as dependency on mood altering drugs, etc.

2. Falls within HCST field because

   a) obvious use of science and technology as they affect people and society
   b) raises and exemplifies some fundamental questions about science and technology

3. General issues raised

   a) How has scientific approach altered conception of human body and even mind? Willingness to use certain drugs to manipulate characteristics, e.g., amphetamines, etc. for diet, steroids for muscular development, other drugs to alter moods
   b) How are benefits and costs of drugs distributed in society?
   c) How are decisions made to research and distribute certain drugs? Why development in some areas and not others?

d) What is the proper social control over pharmaceuticals, especially prescription drugs? An example where access is doubly restricted (i) by government approval of use of drug (ii) physicians in prescribing. Also within (i), question of risk/benefit trade off which involves attitudes toward risk, etc.

4. How should it be studied?

a) Case studies of development, use, and marketing of particular drugs, e.g. valium. These might be by one or a few people.
b) Interdisciplinary teams involving persons from pharmacy, pharmaceutical industry, physicians, lawyers, philosophers in bioethics. Choose a particular issue, e.g. contraceptive drugs, and evaluate biological effects (risks/benefits), research and development policy, presciptions (physicians & pharmacists), legal control, ethical aspects of use.

16. Consumer Goods

1. To what extent are complex, high technology goods introduced for others, e.g. electric can openers, food processors, etc? Do these become matters of social status rather than items which are "needed" or even used in households?

2. The whole area raises issues of convenience vs. other values, e.g. prepackaged foods may be more convenient but also are more costly and less nutritious.

3. Falls in HCST field for this is a mundane but significant way science and technology affects daily life.

4. Study should involve inventors, marketing specialists, social psychologists, philosophers, historians, etc.

5. The effects of social science to help promote consumer goods, e.g. social psychology in packaging, economics of production, marketing research, etc.

G. Ernest Best

17. About five years ago the Ham Report appeared on safety in Ontario mines. The report of the one-man commission was highly praised at the time for its sensitivity to all the issues involved.

It is not too early for an appraisal to be made of what in fact has happened to the recommendations of that report. To what extent have they been/not been implemented? On what basis have judgments been made? How have they reflected technical, economic, political and ideological commitments and values? Had other values been considered, how might that have changed conditions?

Obviously, this project would require persons from many different fields, engineers, economists, political scientists, ethicists (themselves working out of different presuppositions) working together. Out of this process new insights valuable for future use by the human community would emerge.

18. I would think that after a sufficient time-period had elapsed a similar appraisal of the Porter Commission on Electrical Energy Use for Ontario would be appropriate.

19. The Churches in Canada as "voluntary organizations" have been involved in many ways in issues that have raised basic value questions for our society. The Berger - Project North - Northern Pipeline Enquiry Value Appraisal has already been funded by SSHRC, under Professor Roger Hutchinson, University of Toronto.

    One straightforward project might be an appraisal of the work of the Commission on Ethics and Genetics of the United Church of Canada. It is rather early to make such an appraisal, but it is a type of project that might yield some helpful insights for the HCST field.

Ontario Regional Group Conference
The Human Context for Science and Technology
May 30, 1980 - June 2, 1980

Participants

Professor John Auld	Department of Consumer Studies, University of Guelph, Guelph, Ontario, N1G 2W1
Dr. Michael Bayles	Director, Westminster Institute for Ethics and Human Values, Westminster College, 1467 Richmond Street, London, Ontario, N6G 2M2
Professor Ernest Best	Department of Religious Studies, Victoria College, University of Toronto, Toronto, Ontario, M5S 1K7
Dr. Conrad G. Brunk	Director, Peace and Conflict Studies, Conrad Grebel College, Waterloo, Ontario, N2L 3G6
Dr. David Brusegard	Adviser on Social Indicators, Statistics Canada, 25th Floor, Coat's Building, Ottawa, Ontario, K1A 0T6
Mr. Terry Burrell	Victor and Burrell Research and Consulting, 72 Gothic Avenue, Toronto, Ontario, M6P 2V9
Professor Julian Davies	Department of Computer Science, University of Western Ontario, London, Ontario, N6A 3K7
Mr. Charles Figueiredo	Victor and Burrell Research and Consulting, 72 Gothic Avenue, Toronto, Ontario, N6A 3K7
Dr. Kirk Hamilton	Structural Analysis Division, Statistics Canada, 24th Floor, Coat's Building, Ottawa, Ontario, K1A 0T6
Dr. J. Havelka	Department of Psychology, King's College, Epworth Avenue, London, Ontario, N6A 2M3
Professor Barry Hoffmaster	Department of Philosophy, University of Western Ontario, London, Ontario, N6A 3K7
Professor Cliff Hooker	Department of Philosophy, University of Western Ontario, London, Ontario, N6A 3K7
Professor Ray Jackson	School of International Affairs, Carleton University, Ottawa, Ontario, K1S 5B6
Professor Russel Legge	Director of Studies, St. Paul's United College, Westmount Road N., Waterloo, Ontario, N2L 3G5.

Participants (cont'd)

Reverend Jean-Guy Lemarier	Faculty of Theology, Saint Paul University, 223 Main Street, Ottawa, Ontario, K1S 1C4
Professor Alex Michalos	Department of Philosophy, University of Guelph, Guelph, Ontario, N1G 2W1
Mrs. Nancy O'Brien	1489 Richmond Street, London, Ontario, N6G 2M1
Mr. John B. Robinson	153 Evelyn Avenue, Apartment 2, Toronto, Ontario, M6P 2Z6
Professor Michael Ruse	Department of Philosophy, University of Guelph, Guelph, Ontario, N1G 2W1
Mr. Ted Schrecker	Research, New Democratic Party, Room 218, North Wing, Main Parliament Building, Queen's Park, Toronto, Ontario, M7A 1AZ
Professor T.W. Settle	Office of the Dean, College of Arts, University of Guelph, Guelph, Ontario, N1G 2W1
Dr. Ben Singer	Department of Sociology, University of Western Ontario, London, Ontario, N6A 3K7
Professor D. Torgerson	Faculty of Environmental Studies, York University, 4700 Keele Street, Downsview, Ontario, M3J 2R2
Professor William Vanderburg	New College, University of Toronto, Toronto, Ontario, M5S 1A1

Ontario Regional Group Conference
The Human Context for Science and Technology

Interested People

Dr. Lewis Auerbach	Research Advisor, Canadian Radio-Television and Telecommunications Commission, Ottawa, Ontario, K1A 0N2
Professor M. Chevalier	Faculty of Environmental Studies, York University, 4700 Keele Street, Downsview, Ontario, M3J 2R2
Dr. B. Dickens	Faculty of Law, University of Toronto, Toronto, Ontario, M5S 1A1
Dr. J. Di Stefano	School of Business Administration, University of Western Ontario, N6A 3K7
Professor D.H. Flaherty	Department of History, University of Western Ontario, N6A 3K7
Mr. Marc-Andre Fredette	Research Officer, Aid & Development Division, Policy Branch, C.I.D.A., 200 rue Principale, Hull, Quebec, K1A 0G4
Professor C.C. Gotlieb	Department of Computer Science, University of Toronto, Toronto, Ontario, M5S 1A7
Mr. Mike Gurstein	Suite 3, 94 Wurteinburg Street, Ottawa, Ontario, K1N 8M2
Dr. Ross Hall	Department of Biochemistry, McMaster University, Hamilton, Ontario, L8S 4K1
Mr. Trevor Hancock	Health Planner, Program Support & Advocacy Unit, Department of Public Health, City of Toronto, City Hall, Toronto, Ontario, M5H 2N2
Mr. E.W. Keyserlingk	Project Coordinator, Protection of Life Project, Law Reform Commission of Canada, 130 Albert Street, Ottawa, Ontario, K1A 0L6
Professor Steven Langdon	Department of Economics, Carleton University, Ottawa, Ontario, K1S 5B6
Dr. Avrim Lazar	Policy Planning & Development Branch, Department of Justice, Ottawa, Ontario, K1A 0H8
Professor Trevor Levere	Institute for History and Philosophy of Science and Technology, University of Toronto, Toronto, Ontario, M5S 1A1

Professor Abbyann Lynch	Department of Philosophy, St. Michael's College, University of Toronto, 81 St. Mary St., Toronto, Ontario, M5S 1J4
Professor R.V. Mason	Department of Psychology, Wilfrid Laurier University, Waterloo, Ontario, N2L 3C5
Ms. Heather Menzies	465 Somerset Street W., Apt. 7, Ottawa, Ontario, K1R 1J7
Professor Judith Miller	Science Adviser, Science Council of Canada, 100 Metcalfe, Ottawa, Ontario, K1P 5M1
Mr. Ruben F.W. Nelson	Square One Management Ltd., #302-100 Gloucester St., Ottawa, Ontario, K2P 0A4
Professor R.C. Paehlke	Environmental and Resource Studies Program, Trent University, Peterborough, Ontario, K9J 7B8
Mr. Murray Randall	Canadian Labor Congress, 2841 Riverside Drive, Ottawa, Ontario, K1V 8X7
Mr. Ernie Regehr	Institute of Peace and Conflict Studies, Conrad Grebel College, Waterloo, Ontario, N2L 3G6
Dr. Bruce Sinclair	Director, Institute for the History and Philosophy of Science and Technology, Toronto, Ontario, M5S 1A1
Professor Sharon Sutherland	School of Public Administration, Arts Tower, Carleton University, Ottawa, Ontario, K1S 5B6
Dr. J. Turner	Director, Health Care Research Unit, University of Western Ontario, London, Ontario, N6A 3K7
Dr. Robert J. Uffen	Dean, Faculty of Applied Science, Queen's University, Kingston, Ontario, K7L 3N6
Mr. Peter Warrián	Director, Research Department, United Steelworkers of America, 55 Eglinton Ave. E., Toronto, Ontario, M4P 1B5
Dr. Wendell W. Watters	Professor of Psychiatry, Chedoke-McMaster Hospital, Box 2000, Station 'A', Hamiton, Ontario, L8N 3Z5
Dr. Norman White	Environmental Health Unit, McMaster University, Hamilton, Ontario, L8S 4L8

WESTERN REGION REPORT

FIRST MEETING

The Human Context

We live in the belly of the whale.
It we anatomize.
We install a microscope.
The whale dies.

We hire a whalologist.
The ocean dies.
We hire an oceanologist.
The oceanologist survives.

Whenever three analysts.
Are gathered together in my name.
One fills out an expense account.
And the others do the same.

They form an executive
And apply for travel grants.
After all, look at whales they say,
And oceans, no longer alive.
We'll study us, we survive.

Don Kerr
May 23/80

1.0 INTRODUCTION

This report of the first meeting of the Western Regional Subgroup is intended to summarize the reaction of participants to the preliminary report to the Social Sciences and Humanities Council of Canada by Dr. Cliff Hooker and in conjunction with the creation of a new strategic granting programme, 'The Human Context for Science and Technology'. In addition, the report presents the perspectives and biases of the Western Regional Subgroup relevant to the development, content, management and objectives of such a strategic grants programme.

1.1 Organization of the Western Regional Subgroup

The Western Regional Subgroup was organized by an executive consisting of an assistant co-ordinator, Tim Tyler, University of Calgary, and four Provincial Co-ordinators responsible for identifying the community of interest in each of the four Western Provinces, Pat Sloan, Government of British Columbia, Douglas Norrie, University of Calgary, Jim McCrorie, University of Regina, Arthur Schafer, University of Manitoba. From the larger community of interest, Provincial Co-ordinators identified a total of about 30 to attend the first regional subgroup meeting, ensuring that the group was representative across disciplines and included where possible members of government and the private sector. Participants were asked to submit a few pages with their thoughts on the subject and to respond in preliminary fashion to Cliff Hooker's initial report to Council. These documents are appended (Appendix B). The objective of the May meeting, apart from extending the network was to comment on the initial report to Council, and expand or redirect it where deemed necessary. This report consequently expands upon and is a response to the initial documentation as well as being a collection of original thoughts by those in attendance.

1.2 Group Process

The reader unfamiliar with the first meeting of the Western Regional Subgroup is referred to the agenda (Appendix A). Some changes

to the programme were introduced as the process of discussion evolved.

Thursday afternoon proceeded as indicated in the agenda. The evening discussion centered about a list of key works generated over dinner by the Provincial Co-ordinators who acted as observers for the afternoon discussion. The list was used as a central focus for further debate and discussion and to generate headings for broad areas of concern which would constitute the basis for this report. The keywords identified were:

GUIDELINES
PRIORITIES
VALUE SYSTEMS - SCIENCE TECHNOLOGY SCIENTISTS AND SOCIETY
CONTINUING THE DIALOGUE
STRATEGIES FOR IMPLIMENTATION
COMMUNICATIONS PROCESSES
UNDERSTANDING? ACTION!
DEATH THROES - SOCIETY - JERUSALEM
INTERDISCIPLINARY
SOCIALLY RELEVANT
POLICY AND RESEARCH
DESCRIPTION/PRESCRIPTION
VALUE FOR VALUE
PUBLIC AND ACADEMIC ROLES

The Friday morning session was spent collectively rearticulating and organizing the keywords into four main subject headings. These headings formed the basis for division of the total group into new subgroups, each one charged with responsibility for developing a section under that particular heading. The four main areas identified, and the modified keywords relevant to each were:

Justification/Preamble

- values - a specific set?
- rationale
- DT's - New Jerusalem

Research Areas

- applied/theoretical
- regional/national/global
- specific topics
- synthesizing themes?

Modus Operandi

- guidelines
- priorities?
- public/academic roles
- evaluation of applications for funding - criteria?
- major/minor grants - mix?
- communications

Our Strategy re SSHRC

- journal
- inter/multidisciplinary
- workshops
- this group role?
- regional structure
- peer review? feedback?

Friday afternoon was spent developing these areas. Participants self selected their involvement in one of the four areas. Presentations and modifications were made by the total group Friday evening and Saturday morning prior to meetings by Provincial represntatives to discuss ongoing and other communications at the Provincial level.

1.3 Organization of Material

Consequently the main text of this report follows the outline and text developed in a preliminary fashion by the group via the process outlined. In addition, I have encorporated points raised when the material was presented to the total group. In the text I have highlighted issues or considerations, usually in question form which remain somewhat open, require some resolution and are particularily relevant to any recommendations we may ultimately make to Council. It is suggested that a second meeting of the Western Regional Subgroup might concentrate on recommendations using this document as a basis for discussion and generation.

2.0 JUSTIFICATION

2.1 Crisis or Opportunity?

We perceive a state of crisis emerging in Canadian Society. Many

of its elements are shared with other industrial urbanized societies, wherever in fact, the technology growing from new scientific discoveries has steadily increased in power and human impact. In Canada such burgeoning technological effects range in a full and complex spectrum from fisheries and agriculture to medicine and mining exploration. Public unease concerning real or potential problems arising from such new technologies is expressed increasingly in protest and violence. People often feel diminished in a world of bigness, a world of systems beyond their control.

This introductory statement is one approach to justifying involvement in this area which of course, makes certain assumptions and adopts a particular perspective. However, some would argue that it is a strategic error to advocate or justify this area on the basis of crisis. There are some areas where there is not yet any crisis (i.e. Canadian agriculture) but where attention and research could produce positive results and possibly avoid the possibility of crisis looming on the horizon (Appendix B, Laird). The importance of the HCST (Human Context for Science and Technology) field outlined by Hooker is a good one. Some additional examples are presented here and the distiction between crisis and opportunity is suggested.

Others would argue that while there is crisis to justify intensive effort in this field, it is of a somewhat insidious nature. There are no bombs - but, our youth experience high unemployment, home ownership is out of reach for many, we are running out of some resources; Cancer, environmental degradation, mounting health care problems and costs; potential alienation in a telematique world, a real sense of 'limits', all are elements of crisis. These and other issues are raised by the accompanying background material (Appendix B).

2.2 A Shared Perspective

There is a problem in justifying the field by appealing to either crisis or opportunity. In doing so examples of potential topics are relevant. 'When "human context" and "science and technology" are used together to define a field, there seems to be little that is *not* included,

yet that was not the intent (Appendix B, Hodgson, p.1). *Are there common values which unite us, which are not currently represented or reflected by any 'legitimate' research body which in and of themselves identify a unique focus when it comes to such an all inclusive area?* This approach to justification is largely unexplored in the Hooker document.

In recommending this are to Council what approaches might we consider?

(a) emphasize the benefits of considering the human context for science and technology.

(b) emphasize the necessity of considering the human context for science and technology (sense of crisis).

(c) emphasize our lack of knowledge as to potential benefits, the nature and extent of any crisis, the role the media may play in such impressions etc.

(d) identify a common set of values not currently applied to such problems, the 'legitimization' of which holds some promise for problem resolution.

(e) all or some of the above.

There is yet another expectation that one can reasonably expect from Council in relation to justification. *What might reasonably be expected from the creation of such a strategic grants program and what is the evidence to support such expectation?* What follows are some observations which have some relevance for strategy and the questions posed.

2.3 Value Change

The area is made more critical by the speed at which science and technology now advance. Man has more power at his fingertips than ever before, and must now catch up to his own potential to influence the world and society. It is our belief that new technology can be implemented in humane creative ways--but only if much greater care is given to the study of implications and consequences. HCST can address itself to such problems, to the *why*, and *for what ends* we in Canada might redirect some of the trends in our society.

Underlying the evident mismatch between human aspirations and the realities of the modern world lie many poorly understood component factors. It has in the past been deceptively easy to blame historical aspects, especially traditional attitudes and values no longer appropriate. Yet it is a matter of common experience that some values actually can change very rapidly given appropriate circumstances. If one accepts that change does take place and that change, given current scientific and technological developments, is desirable and even essential then not only should this area be funded but with enthusiasm and optimism. The need for a different 'view of man' is perhaps the most common theme uniting the various presentations made to the Western Regional Group (Appendix B, see Kerr, Abramson, Scott, Vertinsky, Ridd).

2.4 The Claim for Holism: Asset or Liability?

Accepting that many of our current problems with scientific innovation and with technology result from an inability to consider complex effects, the holistic approach implied by research in this area is yet another reason for support. The Hooker example (criminology-psychology) illustrates this characteristic. General agreement among participants can be noted (Appendix B, see Abramson, Scott, McCrorie, Blatchform, Jonescu, Ridd).

There are however, some cautionary notes against which this enthusiasm for a holistic approach must be set. The history of inter-disciplinary research has, in Hooker's report to Council, been largely ignored. *What now makes us think, in light of this history, that such research and related activity is possible?* Abramson (Appendix B) has made some interesting observations with respect to the necessity of the 'multipersonal and interdisciplinary methodology and the relationship of the method to a different and evolving 'image of man'.

His comments suggest that organizational programme and institutional considerations; the evolution of 'cultural' factors are more critical to outcome than most of us appreciate. *This probably implies that current thinking with respect to both the 'modus operandi' and our strategy, requires deeper penetration and thought.* How Council sets up

such a program and what auxiliary activities in addition to research, receive support it can be argued are critical to the success of the reseach itself.

Are interdisciplinary methods, the creative process and synergism, prerequisites about which more questions need to be asked and answers sought? The question is relevant, to justification, to the delineation of research areas, to the implimentation of programme and to any strategy we might develop not only for dealing with Council, but with each other. *Will Council's most obvious questions relate to the capacity of the community of interest to function in such a mode? How can we get this creative, interdisciplinary process into action and keep it going?* After all, in the general case, government and most of our institutions (including most *universities*, most of the time) work in the authority patterns (or modality) not its creative one and not with interdisciplinarity (Appendix B, Abramson, p. 3).

While the Malthusian dilemmas posed by Knelman/Hooker* received endorsement and support with the addition of more focus upon urban problems (Appendix B, see Ridd, p. 2) there are clearly other approaches to justification of which we should perhaps be more aware. Furthermore, the linkages of these considerations to other areas and evolving activity merits more attention.

3.0 RESEARCH AND RESEARCH AREAS

3.1 Research Priorities

The Western Regional Subgroup has been asked to lend to the process its sense of 'priorities' for research in this area. *While suggestions for topics and subject areas can be found in the submissions (Appendix B) there was a rejection of this approach as a means of determining what should receive priority for research purposes.* There are however, a number of considerations relevant to determining what

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*Hooker, C. and Schrecker, T., 1980, The Human Context for Science and Humanities Research Council of Canada, p. 8.

gets funded. These factors are perhaps better discussed under 'modus operandi' but paradoxically point out, in themselves, areas where more information is desirable. The presence of interdisciplinary approaches may be used as criteria for funding a particular investigation. *However, as stated previously, we need to ask and seek more answers to this phenomina itself. What of public perceptions of the 'crisis' alluded to earlier? What is their sense of priority? How does the public (and researchers for that matter) come by its sense of importance and priority?* We are also convinced that there are regional factors relevant to questions of priority. This is reflected in the recommendations contained in the section 'Modus Operandi'. *Does not priorization open the possibility of falling victim to that which we wish to better understand?*

3.2 The Interpretation of 'Strategic'

Some clarification for the focus of research and the 'sense' of priority has been sought. *Is this a question of the development of research capabilities in certain areas of the social sciences and humanities, or is it a part of the strategy to seek solutions to certain recognized national problems? Is it a strategy to develop research capabilities in certain institutions or certain regions of Canada?* According to Allen, support for each of these interpretations can be found or read into various parts of the report (Appendix B, see Allen, p. 1). *What is the intent and what do we regard as meaningful pursuit?*

3.3 The Area Defined by Perspective

There is another perspective, mentioned previously and relevant to the 'Modus Operandi' which follow, which simultaneously may be regarded as a criteria which would limit or restrict the scope of research in the manner alluded to by Hodgson (Appendix B, p. 1).

We are trying to describe, not just another "new field" alongside all the other extant ones, but *a new way of looking*, by a new kind of scholar, at what is therefore a new "reality"--evan when the ostensible subject matter is old and familiar. We are trying to describe a new imagination, whose basic distinguishing mark will be a new style of

regarding and describing, even more than it will be new matters to address (though there are plenty of those, especially when we look differently).

Acceptance of such a statement has some major implications for justification, criteria for granting funds, the organization and content of research, related activities and the overall programme. Such a statement implies a unity of purpose and at a certain level, of perspective. *Does such unity exist?*

3.4 Holism and the Identification of Research Areas

Among the Western Regional Subgroup there was also some rejection of the vertical organization of the subject area into three levels, 'general theory','theoretical tools for assessment and management', and 'applied fields'.[*] The fact that any one of these levels stands independently is both an asset and a liability. Perhaps the combinations and permutations require some specification. *Are we interested in research in any one area or is* it *the combination which identif*~~y~~ies *the field?* Holism may be regarded not only in terms of the integration of disciplines but as the necessity to carry theory to applied levels (Appendix B, Ridd, p. 3). Remarks made by Park Davidson (Appendix B, p. 3) reinforce the notion that research be characterized primarily by its 'problem solving' thrust.

3.5 Other Polarities for Defining Research

While we do not feel we can attach priorities to research problems, what, if any, recommendations should be made to Council with respect to priorities given to other aspects of proposed research? (i.e. theoretical/applied; regional/national/global; understanding (knowledge building)/action).

3.6 Research Areas

Three general descriptors for research in the area of the Human

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[*] Hooker, C. and Schrecker, T., 1980, The Human Context for Science and Technology, Social Sciences and Humanities Council of Canada, Annex 1, p. 40.

Context for Science and Technology have been developed by the Western Regional Group. They are:

I. <u>The delineation of ways in which Science and Technology expresses society</u>

1. Shaping of values and attitudes towards social use of Science and Technology by educational institutions and mass media
   - history of (e.g., treatment of Science and Technology in high school texts)
   - current practice
   - new normative ("HCST-type") proposals re: future.

2. Public access
   - the sense of helplessness of those who simply receive the consequences of the social application of Science and Technology
   - the case for public access to information concerning their situation
   - and for their means of exercising some control over it.

3. Study of the values, methodologies, processes of the "technological mind" with respect to
   - physical sciences
   - medicine ("health", "illth")
   - militarism
   - computer communications
   - etc.

4. History of "technology"/"technological imagination": retrospective/ prospective technology assessment
   - including the question of foreign influences, domination.

5. The subject of human responsibility to the quality of the

environment.

- the environmental ethic
- responsibility for 'stewardship'
- aesthetics
- protection of nature in relation to man.

6. "Finite world" questions (Malthusian dilemmas stemming from scarcity-consumption squeeze)
   E.g., re: fossil fuels:
   the question of the social implication of site-specific development of *fossil* fuels < the question of the social implication of this as against the alternative of *other* kinds of energy development < the question of the total social situation which produces the *demand* for these alternative modes of supply.

7. Political economy
   - the study of the structural and institutional context of Science and Technology, its domination by external political/social/cultural organizations.

8. Distribution of social costs/benefits of various Science and Technology systems, necessitated by the approaching end of the "masking" effect the "growth" has heretofore been able to have on society
   - the question of the dignity, opportunity, etc., of people in a time of scarcening resources.

9. Predictive studies re the socio-technological *immediate* (5-10 year) future. E.g.,
   - biomedic
   - silicone chip computer
   - etc.

II. <u>The examination of specific areas in which we get a sense of how Science and Technology impacts society</u>

5. Urbanization/industrialization
   - how society has become confused and dissatisfied with the growth of cities (historical, sociological analysis)
   - how Science and Technology may be used to make this context for human living (the city) more humane and workable for all, specifically re:
     - energy consumption, and directions for conservation
     - rail yard relocation to free urban cores for efficient planning
     - loss of sense of neighbourhood through development of urban sprawl, spawned by engineering efficiencies and "marketplace" considerations
     - high cost of city life--financial and psychic
     - etc.

III. <u>The examination of areas which indicate possibilities of, and ways to, change and control our situation</u>

10. The "new field" itself:
    - its assumptions, its typical practicioners, their manners of approach, methods; perhaps via specific examples of research done in the manner of

HCST	multidisciplinarianism
HCA	"blik"-ism
* the new imagination	synergism
holism	

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*By whatever name, we intend a discipline or field/manner style of *interest* (Hooker) which thinks its subject matter(s) "whole", and has a reflexive feedback model of procedure as the core of its project. Enquiry directed by these concerns is what is called forth in research and in social activation. The individual, communities, and larger societies--all levels of human welfare and development must be sought as part of our search for efficiency and productivity through Science and Technology.

4.0 MODUS OPERANDI

The recommendations contained in this section received unanimous endorsement by those in attendance at the first meeting of the Western Regional Subgroup. However, it would probably be recognized that they are a starting point and need rearticulation in light of the crystalization of the content and issues raised in the preceeding sections.

4.1 Continuing the Discussion

There was some concensus that research was not the only purpose to which available funds should be put in order to develop a concern, interest and expertise in the area. The 'Kananaskis experience' was deemed to be a relaxed, worthwhile, interesting and seldom experienced opportunity to cross disciplinary boundaries and to exchange ideas outside of formalized institutional roles. The setting was felt by the group to be particularly conducive to achieving meaningful discussion, away form the standard symbols of who we are and the social and institutional roles we play.

This experience prompted other suggestions not entirely reflected in the various points found later in this section.

Should Council devote budget to the regular 'bringing together' of scholars across disciplines in settings where the normal barriers are 'down', and the exchange of experience and insight can readily take place? Academics, not unlike politicians, when confronted with certain settings and audiences feel compelled to perform in specific roles, politically and in terms of image, supposedly to their advantage, but not very conducive to meaningful progress on problems and issues. Increasingly we see politicians retreating to informal settings to 'get things done'. The same general approach may be applicable to facilitating communication across disciplines. Conferences and formal workshops are perhaps not an appropriate vehicle. Such experience could be an essential part of the development of community, and needs to consider the involvement of students and the 'external' community. The format for such regular gatherings merits some attention. *Could they be conducted on a regional level? Should they take the form of 'think tanks' and move as far away as possible*

from the established conferencing mode?

4.2 Auxiliary Activities

Other suggestions relative to building strength in this area include the formulation of recommendations dealing with programmes to encourage students to cross disciplines for post graduate training. *Should Council fund post graduate opportunities in the social sciences and humanities for those with degrees in the physical sciences and engineering?* (Appendix B, see Samoiloff). The notion of funding small 'case studies' from which models could evolve was suggested (Appendix B, Allen). This affects the development of general guidelines and the allocation of funds.

What guidelines for the selection of research will we recommend to Council? David Godfrey (Appendix B, p. 5) suggesting that the available funding allows for token (abeit important) research, puts forth a number of operating criteria relevant to decisions about the dispersal of funds. These include:

- be cost effective
- should not duplicate other research
- have high Canadian relevance
- should encourage other funding bodies to 'look at research results'
- should encourage more holistic research and comprehensive results.

He further provides criteria for ensuring the social efficiency of research.in this area (Appendix B, Godfrey, pp. 5, 6). A further recommendation for the creation of a regular publication dealing with area is contained in the 'modus operandi' which follow.

4.3 Recommendations

A. Formation of a Group.

The formation of an HCST association or society appears advisable. It should contain a balance of academic, business, union and community group researchers.

B. Allocation of Funds

1. 40 to 60% of funds should go to major projects. i.e. those requiring over $50,000 per annum.
2. 15% of funds (a maximum) should go to communications: journals, workshops, association fundings, etc.
3. the remainder of funds should be allocated to standard research grants.

C. General Guidelines

1. Interdisciplinary research should be encouraged, with a balance among the approaches of science, social sciences and the humanities.
2. Some preference should be given to projects which are relevant to current concerns in Canada.
3. Some preference should be given to projects in which researchers from business, unions, government and/or community groups participate.

Applications may include provision for up to 1/2 of the salary of such researchers, with the remainder coming from the employer. This would encourage a wider source of funds and help establish that the research is relevant.

4. Three regional panels should be established (East, Central, West) and they should judge and allocate funds for standard research grants.

This assumes that the standard research grant funds are split among the three regions on a population basis. We accept as a premise that the users of such research have a relatively equal need for such research no matter which region they inhabit.

5. The national panel should consist of six members from each of the three regions. They will jointly meet to decide on the major grants and the communications grants.
6. These eighteen judges shall be selected from a list of 54 names of qualified persons submitted to SSHRC by the HCST Association. The panel should not consist solely of academics and should properly represent the three regions.

7. The term of these grants, of whatever type, may be one, two or three years. Major grants will be monitored with annual progress reports and site visits as required.

D. The Application Process

1. The structure outlined above puts certain constraints on the application process. It was felt that other details could be left to SHRCC in consultation with a sub-group of the Association. Looking at NSERC models, it was felt that a panel of 18 could review all applications and that an intermediate stage of outside referees was perhaps unnecessary.
2. An explanation of the proposed methods of distributing research results should be part of each application and funds (along the NSERC model), could be requested to support such distribution of results.
3. Some standard assurance that research outputs should be available to the public ought to be included in the application.

E. Some Roles for the Group

1. The Association for the Human Context of Science and Technology (?) will help ensure that the results of all research in this field reach the widest possible audience. Methods would incude co-publishing, a catalog, and possibly a central location where all research documents could be purchased.
2. The Association should consider holding workshops that include non-academics and address the question of research gaps within this field. It was felt that users or participants might see areas of research that academics had missed or under-valued.
3. The Association, through a sub-group, would monitor the progress and methods of SSHRC in supporting this field of research and continue to consult on the necessary modifications of the program.

5.0 STRATEGY

5.1 Rationale

If as a community of interest we are convinced of the merit of working in this area then there is a need to ensure that the community is sufficiently strong and active to ensure that it contributes effectively to meeting those goals upon which we agree. We must therefore consider our strategy in dealing with Council. This aspect of our activity has been largely omitted by the preliminary document to Council, as logically it should. However, as the community of interest evolves, so must the strategy. Justification for an ongoing community of interest has been presented building upon Hooker's initial report and noted in terms of precedent, unrest, crisis and evolutionary change.

It is suggested that in order to have 'a group' there must be enough agreement among enough participants or a critical mass and common purpose, coupled with intellectual and emotional commitment to the agreed upon goals. Can these criteria be met? The goal: 'a surviving planet with human decency'.*

5.2 Objectives of Strategy Development

There are a number of explicit objectives of developing a strategy. These objectives are:

1. To form an on-going group
2. To promote group cohesion
3. To promote resource availability
4. To develop a collective competence for desired social change (goals).

5.3 Areas for Goal Formulation

In turn, there are three ares to which the need for goal formulation strategy can be directed.

These are:

1. In relation to HCST - (survival/effectiveness)
   - Increasing change requires an increasing mass and/or

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*courtesy of Albert Comonar, British Columbia

competence

- Recruitment on the basis of shred sentiment (value congruence)
- Public impact of HCST makes an expanding base important (change agents create a multiplier effect).

2. In relation to SSHRC - (legitimation of HCST)
   - legitimize
   - production and availability of resources
   - sustain developmental perspective, drawing progressively from accumulating experience
   - does not compromise integrity of the constituency and goals of HCST.
3. In relation to Science/Technology
   - a sustainable condition for the environment and man.

5.4 Group Functions

Similarly, if commitment is made to the importance of the 'human context', there are functions which must be accounted for within the structure of any effective group, including:

- recruitment
- facilitation of individual roles in behalf of HCST
- information and communication
- representation (negotiation)
  - with SSHRC
  - elsewhere (S/T, Prof. Ass'ns, etc.)
- guidelines and criteria development
- role of critic re research process and experience
- mobilization/coordination of research findings
- location for sustaining continuing dialogue
- fiscal responsibility
- data coordination for continuing strategy analysis.

5.5 Principles Bearing on HCST Research Perspective

Accepting the goal for association proposed, principles

bearing on HCST research perspective can be derived. In many ways, this represents another approach to the evolution of guidelines which might be recommended to Council. These formulations reflect the Western Regional Group's observation that central control of research purpose and allocation leads to the possibility of several latent dysfunctions. *Is this bias shared?*

These principles might include:

- research is not the whole of it, therefore, resources must be directed to such subjects as
    - public information
    - value and social goal promotion
    - etc.
- centrality of value considerations, therefore
    - some inquiry addressed specifically to value clarification and the implications of science and technology
    - value significance is conceived to be inextricably incorporated in all applications of science having human consequences (to be made explicit in research design)
    - tactical. If not specifically designed, attempt to associate to other research effort
    - comprehensive perspective
    - attention to differing considerations of the development of research support
    - balance between systematically designed research enterprises, and individually selected research interests
    - purposeful and productive use of the principle of opportunism
    - criteria for approval which do not exclude novel, creative, unusual approaches (perhaps set aside portion of funding for innovative research content, method, etc.).

Our strategy in dealing with Council, in ensuring the viability of our community of interest and in guaranteeing that the principles, goals and objectives to which we agree remain intact, has not been considered in the Hooker report. Is perhaps the process seen as one where Council 'strikes up the band' and marches out the programme? *Do we have a strategy or are we dependent upon the elequence of our case and the benevolence of Council?*

6.0 SUMMARY AND COMMENTS ON A SECOND WESTERN REGIONAL MEETING

The deliberations and preliminary conclusions reached by the Western Regional Subgroup expand and build upon the initial report to Council prepared by Cliff Hooker, as well as posing some new questions and presenting considerations additional to those outlined in the initial report.

The matter of a second Western Regional Meeting merits some consideration. The following are personal thoughts and observations on the content of such meetings here in the West as well as elsewhere. It seems logical that there be some uniform framework with which regional groups might now work in order to facilitate comparison, contrast, debate and resolution when we came together as a national group.

As suggested at the outset, the content may be structured around the notion of recommendations recognizing the likely necessity of presenting Council with clearly defined options and recommendations for decision. This is of course, with the exception of justification and characterization, where further exploration and articulation of our commonalities, goals and objectives is required. Recommendations relating to general areas of research, the organization of activities by Council, grant administration and adjudication, and related activities and their content appear to be within our grasp.

Finally, we may need to deal with ourselves as a community, apart from Council if we believe in the merit of our current deliberations.

The University of Calgary
2920 24 AVE. N.W.
CALGARY, CANADA
T2N 1N4

KANANASKIS CENTRE
FOR ENVIRONMENTAL RESEARCH

Campus (403) 284-5271
Kananaskis (403) 284-5355

June 30, 1980

TO: Cliff Hooker, Barry Hoffmaster, John McCormack, Jean-Claude Guedon; participants, Western Regional Subgroup, The Human Context for Science and Technology

FROM: Frank Tester, Co-ordinator, Western Regional Subgroup

Please find enclosed an early draft of material emanating from the first meeting of the Western Regional Subgroup. This document is a draft and subject to modification, addition and deletion by participants. I am particularly indebted to Fulton Fisher, Doug Norrie, Albert Comonar, and Carl Ridd for the particular roles they played in drafting material critical to the body of this text.

I have sent copies of this document to the Provincial Co-ordinators of the Western Group and understand that Cliff will take responsibility for providing them with extra copies for distribution to the larger community of interest they have identified. In addition, I understand, Cliff will mail directly copies to each of the participants in the May 22-24th meeting, so that chey may contact the Provincial Co-ordinators with their recommendations for change. I also understand copies will be made available to other regional group members. Please ensure that this letter accompanies each document. A mailing list of those in the Western Regional Subgroup who should receive copies is attached.

Frank Tester
Co-ordinator
Western REgional Subgroup

FT:sc

The University of Calgary
2920 24 AVE. N.W.
CALGARY, CANADA
T2N 1N4

KANANASKIS CENTRE
FOR ENVIRONMENTAL RESEARCH

Campus (403) 284-5271
Kananaskis (403) 284-5355

WELCOME TO THE KANANASKIS CENTRE

INTRODUCTION

I would like to refer to this meeting of a Western Regional Group to discuss the subject, 'The Human Context for Science and Technology' as a 'think-tank' operation. Therefore, no papers or formal presentations are part of the programme and we have attempted to construct an evolving agenda (attached) with particulars subject to the perceived needs and observations of yourselves.

BACKGROUND

Attached to this 'Welcome' is a letter of several pages sent out by Cliff Hooker to participants in an exercise held last November to take an initial look at the subject area, 'The Human Context for Science and Technology'. The results of this workshop are contained in the volume we are making available to you. Most of you will have already seen Cliff Hooker's initial report to Council. The blue-covered report contains as well, all of the supporting documentation, and has been presented to the Social Sciences and Humanities Research Council.

The attached letter outlines the intent and purpose behind the establishment of regional groups. I suggest you read it carefully. In addition to this 'think-tank', we will be meeting again this fall to 'crystalize' our perspectives and priorities as well as to assess resources for work in this field.

PURPOSE

It has therefore been suggested that this exercise have several objectives. However, I wish to make it clear that you are free to take issue with this perceived mandate and to pursue the directions of meaning to yourselves as participants and individuals concerned with this field. The purpose of the 'think-tank' is to (a) expand the network of people familiar with these efforts, and to encouragé among them enthusiastic support, ongoing criticism, and input to the development of this new grants area, (b) to initiate a consolidation of opinion related to (1) justification for funding this area; (2) the characterization of this field; (3) any priorities which should be associated with work in this area; (4) the resources available or needed which might be brought to bear on the subject matter; (5) any processes and procedures which might be helpful to the development of research and a concern for the field in general.

FUTURE DIRECTIONS

Our next meeting, possibly in September, will be for the purpose of focusing our discussion and as suggested by the attached, may be so specific as to suggest research topics, areas, programmes etc. Again, as far as I am concerned, you are free to take issue with this perception of our mandate.

In October, it is likely that the four provincial co-ordinators, the assistant regional co-ordinator and myself will take your views and sense of direction to a national meeting. Following this, a report and recommendation will be made to Council for the development of this strategic grants area.

ATLANTIC REGION REPORT

SECOND MEETING

REPORT ON THE SECOND ATLANTIC REGIONAL WORKSHOP ON THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

by

John R. MacCormack, Director, Institute of Human Values
Saint Mary's University

FIELD STRUCTURE SUPPORT - COMMUNICATIONS

In view of the relatively small national HCST budget, it was felt that expenditure on the national superstructure should be kept to the minimum necessary for effective operation. Although a national channel of communication was necessary, projects such as a national newspaper and a journal were thought to be too ambitious.

At this stage, it was emphasized, a highly important job of education and consciousness-raising remains to be done. Inter- as well as intra-university communication must be vastly improved and the interaction between academics and their respective communities strongly promoted if this is to be accomplished. The object should be to establish an HCST group in every university and to promote communication between these groups both regionally and nationally.

There was considerable support for a major effort in the area of popularization and it was pointed out that the communications problem which impedes the interdisciplinary exploration of the field might be in large part overcome if we make a determined effort to clarify the major issues for the man in the street rather than the academic. This would imply use of the mass media as well as the organization of seminars bringing academics and concerned citizens together. A serious communications

problem exists in most universities which is not unconnected with many of the problems which have arisen in the HCST field. What appears to be needed is some agency within the university which will promote faculty interaction as well as the kind of curricular reform which will improve the quality of high level decision making in both governments and corporations. (Allan Bird)

Both objectives might be at least partially won by the establishment of a faculty seminar in each university for the exploration of the HCST field. Inter-university communication between these seminars could be furthered by the use of the recently introduced technique for conferences by television.

FIELD RESEARCH SUPPORT/RESEARCH ACTIVITY

There was strong support for the substitution of "enquiry" for "research" on the grounds that if we are to make progress in answering the fundamental question: "what is the human context"?, reflection and dialogue on work done is much more important at this stage than is the mounting of large scale quantitative research projects. The technologizing of research is part of the problem rather than the solution. What we really need is to improve the quality of the questions we are asking and to do this we must synthesize the results of work done in all disciplines. The saying "garbage in; garbage out" at least as applicable to research projects as it is to the programming of a computer. With respect to regional structures, though the general opinion was unfavourable to the establishment of any complex bureaucracy, a resolution favoring the designation of the Institute of Human Values as the coordinating agency

for HCST activity in the Atlantic region and calling for adequate financial support to this end, was unanimously supported. The Institute was seen as working closely with other such Institutes in the region, particularly the Tompkins Institute of Values and Technology at the College of Cape Breton.

The participants strongly favoured the "small is beautiful" approach to the funding of the field at least for the time being, and reccommended that no more than 20% of the available funds be spent on large scale research projects, with the remainder divided between enhancement of communication, fellowship support and small projects. It was felt too that the $2500 ceiling on small grants should be increased at least to $5000. Such grants would support the organizing of seminars in each university the object of which would be mutual enlightenment at this stage leading up to comparative studies. There was widespread support for a strong Atlantic regional emphasis on the grounds both of the distinctive character of the region and because the universities of the region are in general tied to distinct cultural enclaves within it. This provides the possibility of useful comparative studies by university and community based teams on the impact of sicence and technology on quality of life. The purpose would not, however, be navel gazing but the production of studies which would have national and perhaps international significance. (See Appendix A for a suggested model for such an investigation)

In this connection there was majority support for the establishment of a regional committee which would formulate a research, enquiry and communications project and which would make application to the Council for a grant of up to $50,000 in support of such activity.

DECISION MAKING

The question of regional vs national decision making in the area of project assessment was discussed at length. There was majority support for the principle that a fair share to the total HCST budget should be allocated to regions in recognition of the fact that the regional component in the Canadian "human context" is a highly significant one and the specificity as to community is required if science and technology are to be seen in relationship to the quality of life.

It was generally agreed that a national panel should be established for the adjudication of large grants, such panels should have and should include persons aware of the need not only for action and knowledge oriented research but for reflective and interdisciplinary modes of enquiry. It was suggested that these three categories (action, knowledge and reflection) might be separated for funding purposes so that they would not be forced to compete with one another. There was also strong support for regional adjudication of small grants. After some discussion, however, a resolution was passed "that a significant proportion of the decision-making with respect to funding in the HCST field be made on the regional level."

A strong minority opinion in opposition to regional decision-making was voiced by Peter Dawson, Director of the Tomkins Institute at the College of Cape Breton. Dawson feared that this would result in a regional bureaucracy which would hamper rather than promote the operations of his own Institute. Gordon Inglis (Memorial University), Leonard Pluta (St. Francis Xavier) and des Jardins (University of Moncton) also expressed

doubts about excessive regionalization.

There was general support for the inter-disciplinary approach to the HCST field with some qualifications. It was agreed that an interdisciplinary approach should not be a sine qua non and the formula "inter-disciplinary if necessary but not necessarily interdisciplinary" found general favour. Here one of the major needs appears to be more thought and interchange with respect to effective techniques in interdisciplinary and comparative studies.

There was strong, indeed unanimous insistence on inclusion of a strong humanities component in all enquiry into the field since without such input the "human context" itself remains unexplored. Within this area, the questions relating to human values must be central. Community involvement in enquiry projects was also strongly supported, not only because of the intrinsic value of such contributions but because the presence of "laymen" obliges the academics to abandon their beloved jargon and speak plainly.

With respect to the several questions of financial support for the HCST field a suggestion which gained a strong measure of support was to the effect Unit agencies such a the NRC and Medical Research Council should be approached with a view to persuading them to allocate a portion of their budgets to this area of enquiry.

1. That reflective enquiry should be supported in prefernece to large scale research projects.

2. That a relatively small proportion of the national budget be expended on such large scale grants.

3. That 80% of the national budget be apportioned to small grants, fellowships and communication.

4. That there be an allocation of funds to the regions on an equitable basis.

5. That the regions have a significant share in the decision making with respect to allocation of funds.

6. That national assessing panels be given authority over all large grants and that they be representative of the interdisciplinary point of view and of the regions.

7. That such national panels also reflect in their composition the need for reflective enquiry.

8. That the humanities be given a significant place in all investigation of human context for science and technology.

Institute of Human Values

Saint Mary's University, Halifax, Nova Scotia, Canada B3H 3C3 (902) 422-7331

TECHNOLOGY AND COMMUNITY - A PROPOSED MODEL

The central problem in the exploration of "The Human Context for Science and Technology" relates to the development of a method for the exploration of the "human context". Becase we are concerned here with the quality of life, the humanities must be brought into the equation, quantification is not enough.

When, however, we bring in the so-called "soft" methodologies we are faced with the problem of validation. We tend to assume when we leave the apparently sure ground of mathematical correlation we enter a kind of subjectivist swamp in which one opinion is as good as another.

And yet there is a middle ground between subjectivism and positivism and it is found in its most developed form in the historical method and explanation. In this discipline we are concerned with the development of a convincing argument on the basis of evidence rather than with unquestionable proofs. We are dealing in the area of probability rather than absolute certainty. For the historian, talking about the quality of life is not essentially different from reconstructing human personalities and relationships. Both involve constant synthesis and comparison in the sifting of evidence and the building up of an argument for this or that interpretation. It is this mode of enquiry which can provide us with an appropriate theoretical basis for the use of the comparative method in the exploration of the Human Context for Science and Technology.

It so happens too, that the university/community pattern in Atlantic Canada makes such an approach both attractive and practicable. One of the interesting features of the region is its "patch-work quilt" character which is a result of the fact that ethnically distinct groups settled in particular localities and preserved their cultural traditions with great tenacity,

very often creating educational institutions whose aims and objectives reflected those particular cultural values. Because of this, the region is of considerable interest to cultural anthropologists. It may be noted, in this connection, that one of our anthropologists found this region particularly attractive because of the possibility of carrying out comparative studies of these cultural enclaves.

At the end of my report I list five possible project areas upon which there appeared to be some con ensus at the May meeting. They were: the character of the interaction between the corporate world, government, science and technology (referred to henceforth as the "four-way interface"); a comparative study of the quality of life in the Atlantic region; problems associated with short-sighted misuse of the ecological environment; the development of an epistemology which would justify the use of both "hard" and "soft" methodologies and permit interaction between them, and problems associated with the impact of the micro-chip.

Until recently it appeared that these projects were separate and distinct, and best investigated in that light. It now appears to me that, given the infra-structure already referred to, we have an opportunity to investigate them simultaneously with much more fruitful and stimulating results. The "four-way interface" can be explored abstractly, but it seems much more effective to do so in conjunction with particular problems associated with distinct communities. Similarily, it now seem obvious that a comparative study of the quality of life in Atlantic Canada would make a significant contribution to the HCST field only insofar as it was linked to the impact of the "four-way interface" upon that quality and was focussed on specific communities.

Such an investigation would require the collaboration of the social sciences, the natural sciences, and the humanities and this collaboration raises epistemological questions that are by no means settled. It can be argued, however, that the best way to make progress on this problem is to "learn by doing", that is to examine the actual interaction between the insights of humanists, social scientists and scientists when they are engaged in exploring a common problem. The epistemological problem is one which is concerned above all with judgement and action and is best explored in conjunction with them.

The Annapolis Vally is an example of a region in Nova Scotia which has a distinct cultural heritage and a university (Acadia) which is its institutional expression. If this type of exploration were carried out in that region, a team would be organized based on Acadia but perhaps including persons from other universities and from the community itself, which would be divided into three sections. Section A would concern itself directly with the "four-way interface"; Section B with the quality of life and Section C with the epistemological implications. There would be constant interaction between the sections.

Similar teams could be organized in Newfoundland based on Memorial and its subsiduaries; in Cape Breton (College of Cape Breton); Eastern Nova Scotia (Saint Francis Xavier); Halifax (Dalhousie, Saint Mary's, Mount St. Vincent); Acadian regions (Universities of Moncton and St. Anne); New Brunswick (University of New Brunswick and Mount Allison); Prince Edward Island (University of Prince Edward Island and the Institute of Man and Resources). It would be of the first importance to ensure regular communication between the appropriate sections of the various teams which, in turn, would illuminate and reinforce the interaction between the three sections of any one team. The whole effort would be seen as one project, and could produce a series of important publications.

The objective of the Institute of Human Values since its beginnings has been to develop a critique of culture based on a cross-cultural and interdisciplinary approach to what might be called the quality of life problem. To this end we held three conferences between 1976 and 1978, the papers of which were published in volume XV (1979) of Humanitas. The approach is best judged by reading all three issues but the way in which contributors from diverse disciplines can be mutually enlightening is demonstrated in my introduction to "Beyond Relativism", copies of which are available on the side table.

The conferences have put the Institute in touch with many scholars of world rank who are concerned with the quality of life on what might be called the macro-scale of cross-cultural comparison.We intend to continue to work on this level and we see the possibility of highly stimulating interaction between such activity and involvement in the HCST field in the Atlantic region.

John R. MacCormack, Ph.D. — September 26, 1980.
Director

ONTARIO REGION REPORT

SECOND MEETING

Ontario Regional Group Meeting
The Human Context for Science and Technology
September 12-14, 1980

Recommendations of the Ontario Regional Group for Funding The Human Context for Science and Technology Field

1. Funding in the HCST field should fall into three areas: Field Establishment, Study and Interchange, and Research.

   a) The Field Establishment area would include activities such as publishing a national newsletter and compiling and distributing a directory of resources. The task of publishing a national newsletter would be the responsibility of the national panel (see 5 below), but the content for the newsletter would come from the regional groups. Each regional group could conduct an inventory of academics and non-academics, for example, people from community groups, trade unions, and women's groups, interested in research in the HCST field. (Anyone who has a university appointment or a connection with a major government or private research centre qualifies as an academic for the purposes of these recommendations.)

   b) In the Study and Interchange area funding would provide opportunities for academics and non-academics to prepare themselves to do research in the HCST field. Access to research tools for community groups, trade unions, women's groups, etc., also would be made available through projects such as "store-front" academics and secondments.

   c) In the Research area, two separate categories of research would be described for applicants. One would cover research done primarily or exclusively by academics, where the emphasis is on innovative or novel approaches to problems or issues in the HCST field. The other would cover policy relevant or problem relevant research that involved non-academics. In this second category, research could be done jointly by academics and non-academics, such as people from trade unions, women's groups, or community groups, or research could be conducted exclusively by non-academics or groups with no university or government affiliation. Funding policy or problem relevant research by non-academics or by groups with no university or government affiliation can be viewed as an extension of "private scholar" research, which currently is provided for by SSHRC guidelines.

2. No funds should be committed now for public education in the HCST field. SSHRC apparently funds public education programs at present. It should be determined whether these general public education funds can be used in the HCST field before HCST funds are spent for this purpose.

3. Adjudication of proposals in the Study and Interchange area should be done by a national panel with balanced regional representation. No external, written assessments should be required for these proposals, but letters of reference could accompany proposals.

4. Adjudication of proposals in the Research area also should be done by a national panel with balanced regional representation. External, written assessments would be required for these proposals. External assessors would be selected from a special pool of HCST assessors. Assessors for a given proposal would be recommended by the national panel and approved by the HCST project officer.

5. The national panel that adjudicates all proposals should consist of twelve members. Two representatives would come from each of the four regions, and at least one representative from each region must be a non-academic. In addition, there would be four at-large members. The at-large members would be nominated by the regional groups and selected by the eight members of the national panel who represent the regional groups. The terms of office of members of the national panel should vary to provide for continuity of membership. Individual terms of office should be negotiable, so that regional groups can get people whom they want to serve on the national panel. In addition, financial need should not be allowed to prevent anyone from serving on the panel. The national panel should conduct periodic reviews (perhaps each year) of its work.

6. A proposal in the Study and Interchange area should compete only against other proposals in that area. Applicants should know the amount of money allocated to this area in each adjudication period and the total number of grants for which they are competing. If no worthy proposals are submitted in a given adjudication period, none should be funded, and money allocated to the Study and Interchange area could be used to fund projects in the Research area.

7. All proposals in the Research area should compete against one another. In other words, although there would be separate categories of research for application purposes, there would not be separate categories of research for adjudication purposes.

8. The following questions should be asked by the national panel in assessing proposals in both the Study and Interchange and Research areas:

   a) Does the proposal fall into the HCST field?

      This is the only necessary condition for funding a proposal. Positive answers to the following questions are merely considerations that count in favor of a proposal. Not all of the questions may apply to every proposal, but a proposal should strive to fulfil as many as possible.

   b) Does the proposal involve non-academics as well as academics?

   c) Does the proposal involve people from more than one area of expertise, interest, training, or background?

   d) Is the social relevance of the proposal explained?

   e) Has provision been made for communicating the outcomes of the proposal? For instance, how will the results of research be communicated to academics and/or to the public audience interested in the problem that has been investigated?

f) Does the proposal have social importance? For example, is the proposal likely to provide a solution for or an understanding of the cause of a public problem or policy issue?

g) Does the proposal cultivate the HCST field? For example, a proposal might cultivate the field by enlarging the network of people involved in the HCST area, by educating others, or by developing structures within the HCST field.

h) Have the fundamental assumptions, presuppositions, values, and beliefs underlying the proposal been identified? This is an attempt to build "reflexive analysis," as described in the report from the November, 1979 national meeting and in the Robinson background paper, "Energy and the HCST," into the proposal.

i) Is the proposal of high quality? The notion of "quality" is left undefined here, but with respect to research proposals, for example, the emphasis should be on funding "quality" research.

9. The national panel should supply a written explanation for negative decisions. When a negative decision is based on a (comparative) failure to fulfil the criteria set cut in 8 above, this should be stated and explained. Unsuccessful applicants should have an opportunity to respond and to re-apply.

10. Funds should be allocated in the following manner:

a) In the first year $25,000 to $30,000 should be allocated to Field Establishment activities.

b) Up to 25% of the funds available in a given year (minus the funds used for Field Establishment in the first year) should be allocated to projects in the Study and Interchange area.

c) The remainder of funds in a given year should be allocated to projects in the Research area.

11. The regional groups should continue to exist at least until the members of the first national panel have been selected. After that, some kind of regional structure would need to be maintained, whether it is the present regional group or another form of regional association, so that succeeding members of the national panel can be selected, information can be supplied to the national newsletter, and local and community groups can obtain assistance in developing proposals for funding.

Six delegates were elected to represent the Ontario Regional Group at the national meeting. They are: Michael Bayles, Barry Hoffmaster, Ray Jackson, Heather Menzies, John Robinson, and Sharon Sutherland. Sharon Sutherland subsequently has had to withdraw, so a replacement will be selected by the Coordinator of the Ontario Regional Group.

Barry Hoffmaster
London, Ontario

Ontario Regional Group Conference
The Human Context for Science and Technology

September 12-14, 1980

Participants

John W. Abrams	Department of Industrial Engineering, University of Toronto, Toronto, Ontario M5S 1A1
Ted Batke	Professor of Engineering and Philosophy, University of Waterloo, Waterloo, Ontario N2L 3G6
Michael Bayles	Director, Westminster Institute for Ethics & Human Values, London, Ontario N6G 2M2
Conrad G. Brunk	Director, Peace & Conflict Studies, Conrad Grebel College, University of Waterloo, Waterloo, Ontario N2L 3G6
Julian Davies	Department of Computer Science, University of Western Ontario, London, Ontario N6A 5B9
Sue Evans	Research Associate, Institute for Research on Contemporary Interpretations of Man, University of Sudbury, Sudbury, Ontario P3E 2C6
Charles Figueiredo	Victor and Burrell Research and Consulting, 72 Gothic Avenue, Toronto, Ontario M6P 2V9
Helen Forsey	255 Somerset E., Ottawa, Ontario K1N 6V5
Alan Fox	Social Sciences & Humanities Research Council, 255 Albert St., P.O. Box 1610, Ottawa, Ontario K1P 6G4
Barry Hoffmaster	Department of Philosophy, University of Western Ontario, London, Ontario N6A 3K7
Ray Jackson	208 Clemow Ave., Ottawa, Ontario K1S 2B4
Fred Knelman	Science & Human Affairs, Concordia University, 1455 de Maisonneuve Blvd. W., Montreal, Quebec H3G 1M8
Avrim Lazar	Evaluation Unit, Department of Justice, Kent and Wellington Streets, Ottawa, Ontario K1A 0H8
Richard Mason	Department of Education, Hobart & William Smith Colleges, Geneva, New York 14456
Heather Menzies	Apt. 25, 1470 Morisset Ave., Ottawa, Ontario K1Z 8H5
Robert Mitchell	Canadian Hunger Foundation, 323 Chapel St., Ottawa, Ontario K1N 7Z2

John B. Robinson	153 Evelyn Avenue, Apt. 2, Toronto, Ontario M6P 2Z6
Anne Schrecker	P.O. Box 46, Arva, Ontario NOM 1CO
Ted Schrecker	Research, New Democratic Party, Room 218, North Wing, Main Parliament Building, Queen's Park, Toronto, Ontario M7A 1A2
Jim Sheldon	R.R. #2 Highgate, Ontario NOP 1TO
Sharon Sutherland	School of Public Administration, Arts Tower, Carleton University, Ottawa, Ontario K1S 5B6

Interested People

Frances Abele	Department of Political Sciences, McLaughlin College, York University, Downsview, Ontario M3J 1P3
Lewis Auerbach	Research Adviser, Canadian Radio-Television & Telecommunications Commission, Ottawa, Ontario K1A 0N2
John Auld	Department of Consumer Studies, University of Guelph, Guelph, Ontario N1G 2W1
Ernest Best	Department of Religious Studies, Victoria College, University of Toronto, Toronto, Ontario M5S 1K7
David Brusegard	Adviser on Social Indicators, Statistics Canada, 25th Floor, Coat's Building, Ottawa, Ontario K1A 0T6
Terry Burrell	Victor & Burrell Research & Consulting, 72 Gothic Avenue, Toronto, Ontario M6P 2V9
Ian D. Chapman	Director, Administrative & Policy Studies, Trent University, Peterborough, Ontario K9J 7B8
M. Chevalier	Faculty of Environmental Studies, York University, 4700 Keele Street, Downsview, Ontario M3J 2R2
Robert Clarke	59 Second Avenue, Ottawa, Ontario K1S 2H4
Beverlee Cox	Dean, Faculty of Nursing, Health Sciences Addition, University of Western Ontario, London, Ontario N6A 5C1
Frank Cunningham	Department of Philosophy, University of Toronto, Toronto, Ontario M5S 1A1
B. Dickens	Faculty of Law, University of Toronto, Toronto, Ontario M5S 1A1
J. Di Stefano	School of Business Administration, University of Western Ontario, London, Ontario N6A 3K7
D.H. Flaherty	Department of History, University of Western Ontario, London, Ontario N6A 5C2
Marc-Andre Fredette	Research Officer, Aid & Development Division, Policy Branch, C.I.D.A., 200 rue Principale, Hull, Quebec K1A 0G4
C.C. Gotlieb	Department of Computer Science, University of Toronto, Toronto, Ontario M5S 1A1
Mike Gurstein	Suite 3, 94 Wurteinburg Street, Ottawa, Ontario K1N 8M2
Ross Hall	Department of Biochemistry, McMaster University, Hamilton, Ontario L8S 4K1

Kirk Hamilton	Structural Analysis Division, Statistics Canada, 24th Floor, Coat's Building, Ottawa, Ontario K1A 0T6
Trevor Hancock	Health Planner, Program Support & Advocacy Unit, Department of Public Health, City Hall, Toronto, Ontario M5H 2N2
J. Havelka	Department of Psychology, King's College, Epworth Avenue, London, Ontario N6A 2M3
Charles Jeanneret	Vice-dean for Research, Faculty of Social Sciences, University of Ottawa, 550 Cumberland Road, Ottawa, Ontario K1N 6N5
J. Gordin Kaplan	Department of Biology, Faculty of Science and Engineering, University of Ottawa, 30 Somerset E., Ottawa, Ontario K1N 6
E.W. Keyserlingk	Project Coordinator, Protection of Life Project, Law Reform Commission of Canada, 130 Albert Street, Ottawa, Ontario K1A 0L6
Reg Lang	Department of Environmental Studies, York University, Downsview, Ontario M3J 1P3
Steven Langdon	Department of Economics, Carleton University, Ottawa, Ontario K1S 5B8
Russel Legge	Director of Studies, St. Paul's United College, Westmount Road N., Waterloo, Ontario N2L 3G5
Jean-Guy Lemarier	Faculty of Theology, Saint Paul University, 233 Main Street, Ottawa, Ontario K1S 1C4
Trevor Levere	Institute for History & Philosophy of Science & Technology, University of Toronto, Toronto, Ontario M5S 1A1
D.W. Livingstone	O.I.S.E., 252 Bloor St. W., Toronto, Ontario M5S 1V6
Abbyann Lynch	Department of Philosophy, St. Michael's College, University of Toronto, 81 St. Mary St., Toronto, Ontario M5S 1A1
Alex Michalos	Department of Philosophy, University of Guelph, Guelph, Ontario N1G 2W1
Judith Miller	Science Adviser, Science Council of Canada, 100 Metcalfe, Ottawa, Ontario K1P 5M1
Allan Mirabelli	Vanier Institute of the Family, 151 Slater St., Suite 207, Ottawa, Ontario K1P 5H3
Mary Mitchell	Room 109, NRC, 100 Sussex Drive, Ottawa, Ontario
Ruben F.W. Nelson	Square One Management Ltd., #302-100 Gloucaster St., Ottawa, Ontario K2P 0A4

Nancy O'Brien	1489 Richmond Street, London, Ontario N6G 2M1
Beatrice Olivastri	Executive Director, National Survival Institute, 229 College St., Toronto, Ontario M5T 1R4
R.C. Paehlke	Environmental & Resource Studies Program, Trent University, Peterborough, Ontario K9J 7B8
Fred W. Pomeroy	Communication Workers of Canada, 25 Cecil St., Suite 301, Toronto, Ontario M5T 1N1
Murray Randall	Canadian Labor Congress, 2841 Riverside Drive, Ottawa, Ontario K1V 8X7
Ernie Regehr	Institute of Peace & Conflict Studies, Conrad Grebel College, Waterloo, Ontario N2L 3G6
Michael Ruse	Department of Philosophy, University of Guelph, Guelph, Ontario N1G 2W1
T.W. Settle	Office of the Dean, College of Arts, University of Guelph, Guelph, Ontario N1G 2W1
Rose Sheinin	Chairman, Department of Microbiology & Parasitology, Faculty of Medicine, University of Toronto, Ontario M5S 1A1
Bruce Sinclair	Director, Institute for the History & Philosophy of Science and Technology, University of Toronto, Toronto, Ontario M5S 1A1
Ben Singer	Department of Sociology, University of Western Ontario, London, Ontario N6A 5C2
J.T. Stevenson	Department of Philosophy, University of Toronto, Toronto, Ontario M5S 1A1
John Thomas	Department of Philosophy, McMaster University, 280 Main St. W., Hamilton, Ontario L8S 4K1
D. Torgerson	Faculty of Environmental Studies, York University, 4700 Keele St., Downsview, Ontario M3J 2R2
Robert J. Uffen	Dean, Faculty of Applied Science, Queen's University, Kingston, Ontario K7L 3N6
William Vanderburg	Room 2044, New College, University of Toronto, Toronto, Ontario M5S 1A1
Louis Peter Visentin	National Research Council, Division of Biological Sciences, Ottawa, Ontario K1A 0R6
Peter Warrian	Director, Research Department, United Steelworkers of America, 55 Eglinton Ave. E., Toronto, Ontario M4P 1B5
Wendell W. Watters	Professor of Psychiatry, Chedoke-McMaster Hospital, Box 2000, Station 'A', Hamilton, Ontario L8N 3Z5
Norman White	Environmental Health Unit, McMaster University, Hamilton, Ontario L8S 4L8

George H. Crowell	Department of Religious Studies, University of Windsor, Windsor, Ontario N9B 3P4
Ross Male	Technical Information Service, Building M-55, National Research Council, Montreal Road, Ottawa, Ontario K1A 0R6
Lynn McDonald	President, National Action Committee on the status of women, Suite 306, 40 St. Clair Ave. E., Toronto, Ontario M4T 1M9
Sal Restivo	Department of Sociology, Rensselaer Polytechnic Institute, Troy, New York 12181
Patrick Van der Puije	Department of Electronics, Carleton University, Ottawa, Ontario K1S 5B6

H.C.S.T.

Ontario Regional Group Meeting

September 12-14, 1980

Background Information

I. Field Capacity Expansion/Research Capacity

1. Identification of community of interested people (OR, 7)

2. Involvement of people from outside the academic community (OR, 5)

3. Involvement of people from broad range of academic disciplines, e.g., poets, writers, artists (AR, 16)

4. Education of people involved (OR, 4 and Fox, 2)
    a) How to do transdisciplinary research
    b) How to explain human or values implications of research
    c) How to communicate results of research

5. Funding possibilities
    a) Post-graduate opportunities (WR, 14)
    b) Fellowships for inter-disciplinary training (Hooker, 2)
    c) Cross-disciplinary post-graduate scholarships (Hooker, 2)
    d) Business, labour -- university secondments (Hooker, 2)
    e) Release time for faculty (AR, 10)
    f) Interdisciplinary doctoral fellowships (Fox, 2-3)
    g) HCST fellowships (Fox, 3-4)
    h) APA announcement (attached)

II. Field Research Support/Research Activity

1. Kinds of projects that might be funded
    a) Workshops involving non-academics to identify areas that need to be researched (WR, 16)
    b) Small group support to explore a new problem area (Hooker, 2)
    c) Scouting or survey studies (OR, 8)
    d) Small case studies (WR, 14)
    e) Small development grants (Fox, 5)
    f) Simulation run of a large research project (Hooker, 2)
    g) Major grants (WR, 15)
    h) Large research grant to established individual or team for well-defined project (Hooker, 2)
    i) Major interdisciplinary grants (Fox, 5-6)
    j) Standard grants (WR, 15)

2. Decision-Making
    a) Mechanisms
        i) Two alternative peer review procedures (OR, 6-7)
        ii) Regional panels (WR, 15; AR, 6, 18, 20; and Fox, 7)
        iii) National panel (WR, 15)
    b) Membership
        i) Non-academic members (WR, 15; OR, 3; and Fox, 8)
        ii) Number of members (WR, 15 and Fox, 7)
        iii) Selection of members (WR, 15 and Fox, 7)

Decision-Making (cont'd)

c) Criteria (desirable or necessary?)
   i) Interdisciplinary approach to research (WR, 8, 15; AR, 3, 18, 19; and OR, 3)
   ii) "New way of looking" (WR, 8-9 and OR, 4)
   iii) Cost effective (WR, 14)
   iv) Should not duplicate other research (WR, 14)
   v) High Canadian relevance (WR, 14, 15)
   vi) Should encourage other funding bodies to "look at research results" (WR, 14)
   vii) Should encourage more holistic research and comprehensive results (WR, 14)
   viii) Researchers from business, unions, government, community groups, etc. involved (WR, 15)
   ix) Regional factors (WR, 8)
   x) Novel, creative, unusual approaches not excluded (WR, 19 and OR, 5)
   xi) "Soft" methodologies not excluded (AR, 14-16, 19)
   xii) Balance between systematically designed and individually selected projects (WR, 19)
   xiii) Emphasis on values and humanities (AR, 19 and OR, 3)
   xiv) Provision for distribution of reseach results (WR, 16 and OR, 3)
   xv) Social relevance of research specified (OR, 3)

d) Method of calculating costs (OR, 5)

e) Desirability of external written assessments (Fox, 8)

III. Field Structure Support/Communications

1. HCST association or society (WR, 14, 16 and Fox, 6)

2. HCST executive (Hooker, 2)

3. Resource Directory (Fox, 7 and Hooker, 2)

4. Publication
   a) Newsletter (WR, 14; AR, 18; OR, 8; and Fox, 7)
   b) National newspaper (Hooker, 2)
   c) Journal of alternative technology (AR, 11)

5. Clearing house (AR, 18; WR, 16; and OR, 8)

6. Workshops (Fox, 7)

7. Think Tanks (WR, 13-14)

8. Symposia (AR, 18)

9. Radio address/documentaries (Fox, 7 and Hooker, 2)

10. Community seminars (Fox, 7 and Hooker, 2)

IV. Allocation of Funds

1. 40-60% to major projects; 15% to communications; and the remainder to standard grants (WR, 15)

AMERICAN PHILOSOPHICAL ASSOCIATION
Announces a Competition for
1981-1982

Congressional Fellowships for Philosophers
Supported by a Grant from the Andrew W. Mellon Foundation

PROGRAM: In the second year of a three-year program, two philosophers, near the beginning of their scholarly careers, will be competitively selected to spend one year on the staffs of congressional committees or individual Representatives and Senators. The program includes a one-month orientation-placement period followed by nine to eleven months working as a fulltime legislative assistant. Seminars and other events are planned throughout the year.

PURPOSE: To provide a unique public-policy learning experience, to demonstrate the value of such philosophy-government interaction, and to make practical contributions to the more effective use of philosophic knowledge and skills in government.

CRITERIA: Applicants must be U.S. citizens; have a Ph.D. in Philosophy or an equivalent degree; be cognizant of many matters in nonphilosophic areas; be articulate, literate, and able to work effectively with a wide range of people; exhibit the willingness and flexibility to work in many nontraditional areas; demonstrate sensitivity toward the political and social issues of the day; have a strong interest and some experience in applying her or his knowledge and skills toward the solution of societal problems; and have a high tolerance for ambiguity and the capacity to work under severe pressure.

AWARDS: The fellowship stipend is $20,000. An allowance of up to $1,500 is available for relocation and travel expenses.

Application forms and a more complete description of the Program can be obtained from:

Congressional Fellowship Committee
American Philosophical Association
University of Delaware
Newark, Delaware 19711

The deadline for application is December 1, 1980. Names of winners of awards and alternates will be announced by February 15, 1981.

Edmund Pincoffs, Chair
Robert Baum
Michael Hooker
Joan Straumanis
John O'Connor, ex officio

WESTERN REGION REPORT

SECOND MEETING

Preface

This report is a compilation of material produced by the Western Regional Subgroup concerning the creation of a stratigic grants programme, 'The Human Context for Science and Technology.' Three working groups dealing with communication, education and research programmes produced the material for sections 2, 3, and 4 of this report. All groups took a very broad approach to their tasks and there is considerable overlapping of concerns.

Of critical importance to the reader of this document is section 5 which is an attempt to design and present the basics and fundamental outline of a specific strategic grants programme. Readers should reflect upon the extent to which this proposal encorporates concerns raised at both Western Regional meetings recognizing that some compromise must be made. Readers should also note that what is being proposed is the funding of a process, operationalized by regional and national associations, as well as a product. This means that the evolutionary and organic process started with these regional meetings can be ongoing and that future programme activities and directions are limited only by the enthusiasm and imagination of regional and national groups.

1.0 INTRODUCTION

In what follows I have attempted to present the direct results of the two-day workshop as well as to integrate the results from the various working subgroups into a coherent and comprehensive set of recommendations for funding in this field. Participants were divided into three working groups for this meeting and provided with the appended information which outlines the purpose of the workshop, agenda, and subject areas to be considered (Appendix A). The reports of working groups dealing with

- communications
- education and resource development, and
- research programmes

are presented in what follows, along with an integration of findings in each of the three areas.

There has been an indication that first year funding for the 'Human Context for Science and Technology" would probably be at about the $500,000 level. This, it was generally agreed, is a trivial level and necessitates that some special consideration be given to what might be done with such a low level of funding in anticipation of moving toward more meaningful levels of strategic programme support. The integration as well as presentations reflect this immediate as well as more long range concerns. Finally, the discussions reflect an overlap of concerns. It will be noted from the programme (Appendix A) that provision was made to share areas of common concern and this is reflected in the material which follows. In outlining each of the three areas, key words and questions were provided to participants (Appendix A). A list of participants is provided (Appendix C).

2.0 COMMUNICATIONS

This subgroup was asked to make recommendations concerning on-going communications among those concerned with the field in order to develop and promote interest and to communicate developments and findings. They were also asked to provide a rationale for their recommendations.

2.1 Principles

In developing recommendations for expenditures and programmes in this area, the following principles were adopted from which programmes and recommendations could be derived.

1. Communication in the case of this subject matter should refer to the *process of interchange among human systems.** *This useage is in contrast to the narrower focus on the storage and retrieval of information,* so often defined as communication.
2. This interchange should be taken as being continuous, starting with the initiation of overlap among those occupying roles in the human system (consumers, producers, managers) and among those with a focus on different aspects of human systems (social political, technical, economic, cultural). *Communication should attempt to involve more exchange among these various roles and groups* from the point of problem definition through to resolution.
3. The Social Sciences and Humanities Research Council with respect to this subject 'the Human Context for Science and Technology' is in a particularly suitable position to act in a catalytic role in facilitiating this interchange. *There is a need to delineate and make clear the merits of such inter-group communication as well as to explore and acquaint potential beneficiaries with models and means by which communication can be achieved across the various interfaces?*

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*This refers to the exchange of ideas and the modification of human thought and action in a more holistic direction as for example between economic systems, ideas, developments and social ideas, human needs and developments. Human systems refer to all systems which are man-made, be they social, technological, political, or economic, and as represented by those of us who make one or more of these the special focus of our attention. At another level of system definition we are consumers, producers, or managers.

2.1.1 Summary of Principles

There appears to be a need for better communications, both within the research community, and between the research community and the world outside it.

Within the academic community there is need to encourage communication between social scientists and humanists on the one hand, and between both these groups and the science and engineering community on the other. Existing communication channels tend to flow along disciplinary lines and conscious effort is needed to break out of the disciplinary straight-jacket and to understand the perspectives of others who approach the HCST field from a different orientation. Emphasis should also be placedon developing closer ties with the concerned public, both in formulating research plans and in communicating the results of conpleted research.

2.2 Justification

In dealing with these problems, particularly during the first year of funding for the 'Human Context for Science and Technology' the key area appears to be 'communications' and merits perhaps the major portion of available funds.

Justification for this is the fact that should this area be funded, the Council would then be required to generate the infrastructure necessary for organization, publication and communication in general. Although some communication has been facilitated by the consultative process initiated to date, certain aspects of developing networks and communication in this field present difficulties which may require significant attention to resolve.

- the HCST field is completely new and will necessitate special resources in order to create new channels of communication and exchange.
- the field cuts across traditional operational structures and the underlying value and belief systems associated with them.
- an overall infrastructure is essential to the ongoing

operation of programmes in this field as the Western Regional Group envisions it. There is a relationship between the modes of communication and the phases of interdisciplinary research. Communication is not an accessory to or by-product of research but is rather, an integral partner with research and assumes consequently, more importance.

The initial establishment of an infrastructure* is essential to the effectiveness of on-going educational and research activities. This infrastructure has a major role to play in communications. Its development and communication in the HCST field therefore becomes a major initial activity.

2.3 Recommendations

2.3.1 Long-Term

2.3.1.1 <u>The wider public</u>

The HCST endeavour should aim at achieving the widest involvement with the 'conscience' of research, aiming to help the public to better understand the implications of developing different technologies and to assist them in participating in making meaningful personal and societal choices. Researchers and academics should be encouraged to direct time and resources to "disadvantaged groups". The principle of continuous involvement dictates that the wider public should be engaged in projects as early as possible (needs identification, problem definition) and be represented where possible on appropriate committees relating to research and development activities.

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*This is proposed and discussed more fully in the section on integration which follows. Such an infrastructure implies a form of organization and approach slightly different from the traditional centralized and separate programme approach taken in most granting programmes.

2.3.1.2 The research community

The nature of interdisciplinary research, as perceived by those within the subgroup who have experienced interdisciplinary research, is that *form* of communication as well as *content* is important. A high priority should be given to generating and furthering research and demonstration projects related to communication (such as experienced at both Kananaskis workshops) to acquaint persons with the field, various approaches to communication in interdisciplinary situations, the potential and relevance of blending information from various fields, and different models of working together, communicating effectively and of problem solving.

These are of such importance to developing the field that they cannot be handled on an ad-hoc basis, nor should they be dealt with in a trivial fashion.

Consequently we recommend:

1. The formation of an ongoing HCST association at both the national and regional levels.
2. The association with each regional association of a secretariat whose functions would be:
   (a) Workshops (focussed and sequential)
   - to demonstrate and exemplify relevance of various approaches to problem solving
   - to explore new areas of concern in the HCST field as they arise
   - to model research strategies
   - to exchange information and methodologies.

   (b) Newsletters
   - at both national and local levels
   - to exchange information, news, views and to reflect on workshops
   - to inform a wider audience.

   (c) Seminars, forums and sessions intended to evaluate the extent to which activities (research, communication, education) are bringing about a more holistic perspective.

2.3.2 Short Term

In the first year or so of the programme there will be a definite need to begin the establishment of a secretariat, following on the foundation of a regional and national association. The secretariat as a first step should identify exhaustively the research community and establish contact between and among groups and individuals. The secretariat will lay the groundwork for and initiate within the first year the workshops, seminars, and newsletters necessary to bringing people together and to moving toward problem resolution.

The secretariats in each region could also establish directories of individuals and groups working on or interested in working on human/technological problems. While we have an informal knowledge of the breadth of the field and interest as a result of this process, further documentation along specific lines would be useful.

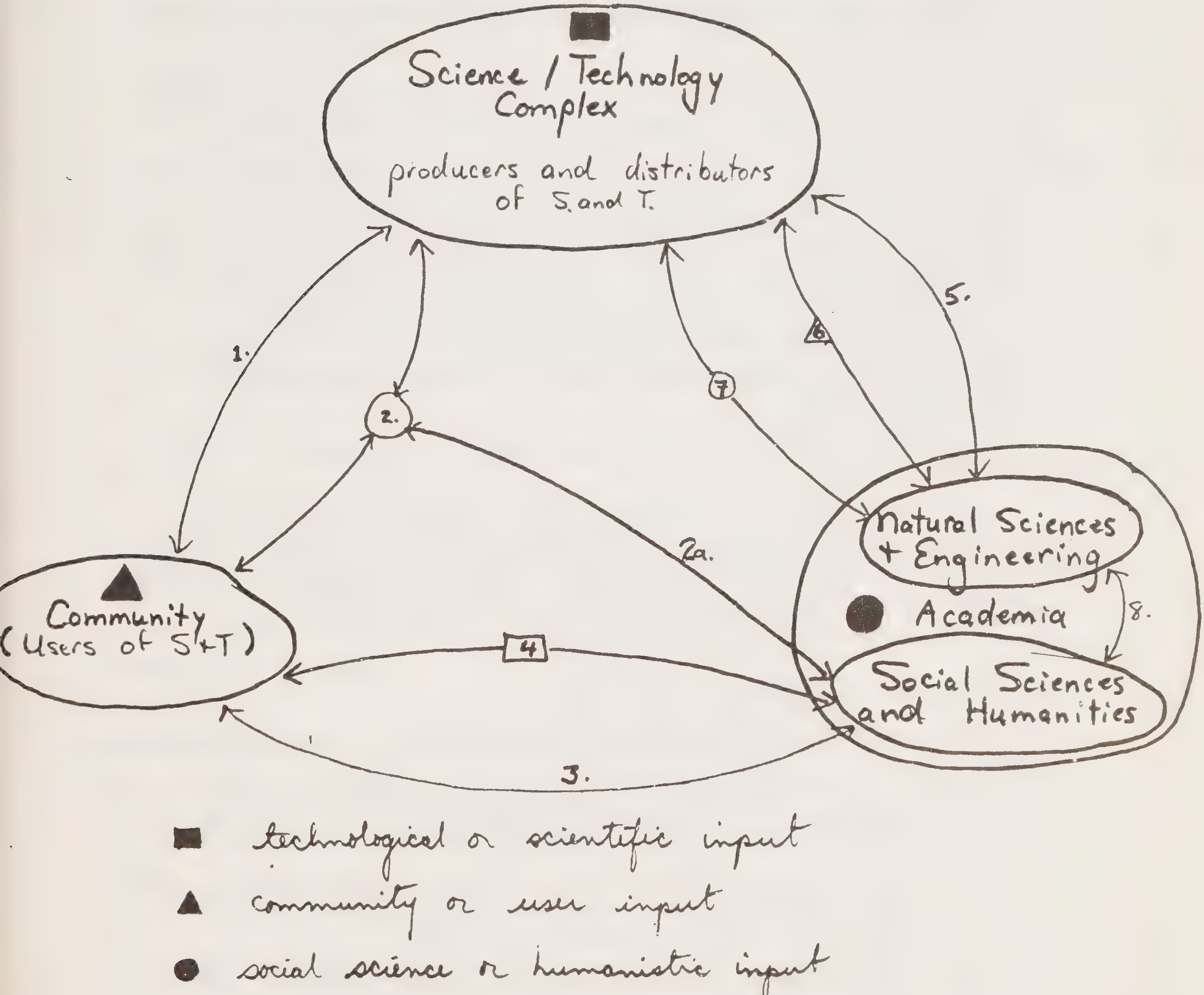
The workshops which would evolve from initial contact with the research community could be focussed on real problems in terms of content and process. Workshops could lead to the development of applications for more extensive research in later years of the programme. This notion is discussed in more detail in the integrated programme discussed later.

3.0 RESEARCH PROGRAMMES

This subgroup was asked to comment on what research programmes council should initiate in this field. This subgroup, not unlike the first group, developed ideas which vary somewhat from traditional granting programs and in similar fashion tied their ideas into a more comprehensive programme of research, communication and education. The group had some difficulty achieving consensus. Some attempt to integrate wide ranging concerns in a meaningful programme is presented in the section 'Integrated Programme'. The report of the First Western Regional Subgroup meeting (May 1980) (Appendix B) was generally supported. Ideas presented here are a refinement and in some cases a modification of those presented at the first regional meeting.

3.1 Areas of Concern

Figure 1 is an attempt to logically identify areas where research is needed and is not currently receiving adequate support. The list which follows describes these areas and interrelationships.



1. Denotes basic problems between technology and user group (private sector funding)
2. Denotes a technological/user group problem but involves a social scientist and/or humanist.

2a. Denotes a purely theoretical or academically defined problem (i.e. standard SSHRC grant funding).
3. Denotes a community problem served by a social scientist or humanist (standard SSHRC or government funding and sometimes private sector funding).
4. Denotes a situation as 3 above but where a technologist is needed or would be an asset in problem solving.
5. Denotes problems in the area of science and technology that require science and engineering input from academia (NSERC funding).
6. Denotes the development of technology by industry and with the help of those in academic areas of engineering and science where user input would be an asset in problem solving (funding ???).
7. Denotes technological problems that could benefit from social science or humanistic input.
8. Interaction between scientists and humanists in academia.

Those areas currently not receiving funding and which could benefit from HCST funding are (2) above, being of the highest priority, areas (4) and (7), with area (8) being of the lowest priority.

3.2 Proposed Objectives of 'HCST' Research

The subgroup considering research programmes adopted the research areas suggested by the draft of the first meeting (Appendix B, pp. 9, 10, 11, 12) and summarized the recommended objective of such a programme as follows.

1. HCST research should facilitate societal decision making with respect to science and technology.
2. HCST research should identify structural changes which will allow society to better cope with and control science and technology. (i.e. changes in democratic processes necessary in an era in which understanding technology in order to make decisions is difficult for many citizens).
3. HCST research should assist affected publics in the articulation of technical/social problems of concern and

should involve them in problem definition and research design.

4. HCST research should include 'listening research' as a compliment to 'curiousity research'.
5. HCST research should be futuristic and project scientific and technological developments and their likely effects on society.

3.3 Possible Research Projects

These are suggested in addition to or to suppliment those suggested in the first report (Appendix B).

- problems of technological scope and scale (mega projects)
- technology and equality of opportunity
- technology and the equitable distribution of resources
- the technological imperative of the armaments industry.

3.4 Focus of Research

There was a consensus that 'relevance' of research projects should be one of the guidelines for funds allocation. Researchers should be encouraged to engage in real-life social/technological problems. However, knowledge building research should not be excluded from a granting programme.

3.5 Programmes

The research subgroup proposed in the first year an '*Exploratory Grants Programme*'. This programme may be seen to have features in common with the proposal developed by the communications group.

This programme would encourage interest in 'real life' problems not currently being researched. It would initially assist in the definition of these and other HCST problems by involving a wide cross section of disciplines and publicly concerned organizations and their delegates. The subject of public perceptions of critical social/technological problems is a topic for exploration itself.

A *Secondment Programme* should be developed to allow researchers

to be seconded to industry or a community based organization to either aid in problem definition or to assist in problem resolution. The objective would be to heighten awareness of the relevance of social and humanistic considerations.

At such time as adequate funds become available, a standard *Research Grants Programme* may be evolved to fund HCST research which is interdisciplinary and relates to public needs and problems.

3.6 Adjudication

It is essential that Adjudication Committees should not be established on a disciplinary basis nor should their membership be restricted to academics. There may be need for a national adjudication committee for some programmes. However, there should be regional committees, mandated to make some decisions and/or responsible for recommending some proposals, or in acting as a 'screening' level, for the national adjudication committee. At least one third of the membership of these committees should be from outside of the academic community.

4.0 EDUCATION AND RESOURCE DEVELOPMENT

The recommendations generated by this group were particularly broad and not restricted to a consideration of education (fellowship, scholarships, bursaries) in the traditional sense. Education was defined as a broader process involving wider publics than merely students or scholars. The following summary reflects this basic perspective.

4.1 Objectives

1. The HCST programme should generate broadly based interdisciplinary research teams/task forces, whose activities will be critical of established values and wisdom. Much current research in the area of science and technology is directed toward consummerism, marketing practices, and the distribution and development of new products, which without consideration of societal implications will lead to an

augmentation of human and social problems. Examples of these areas include developments in the field of communications, energy related developments, medical products, and systems of health care delivery, pesticides etc.

Research should assist the public in asking and receiving answers to questions, inform and educate, as well as generating new knowledge. Education should take two forms; that of modifying the process of technology development by early interaction with technologists and scientists to 'inject' a consideration of human values and societal concerns, and that of questioning already established assumptions. The debate and deliberation should involve the public, students and professionals and thereby serve an educational function.

2. The HCST programme should

- educate various publics concerning the nature and relevance of the concern the social sciences and humanities have relevant to technology. We have, for so long, separated 'fact from value' that many scientists and technologists no longer know what is meant by the term 'social' as opposed to 'economic', nor can they speculate on how the social sciences and humanities might be relevant to their activities.
- bring about an examination of the relevance of advocacy to research practice. (The meaning of research is extended into political proxis at several levels: "research is action, action is research"). This role may assist various publics in undertaking research from their own perspectives and in line with needs as they perceive them.

3. The HCST programme can learn and foster the growth of knowledge by reflecting upon the processes, activities, programmes and results it produces particularly relevant to political and interdisciplinary aspects of the programme. This feedback is an essential component of generating new educational information.

4. The focus of attention should be the Canadian situation but specific channels should be developed for sharing information with developing nations.

4.2 Principles

The subgroup went on to develop principles which should be used in the deployment of HCST dollars. HCST research must:

1. Involve the *disadvantaged*--ranging from third world peoples to consumer society.
2. Provide for research on the *application* (successes and failures) of *interdisciplinary* studies.
3. Include the establishing of *research structures* for accommodating HCST methodology.
4. Include the integrating and *legitimizing* of HCST research in the total research community.
5. Be based in assignment of *balance* between research topics that are immediate and those that are prospective, and between those that are large (task force) and those that are small (exploratory).

4.3 Programmes

The methodology for the deployment of SSHERC/HCST funds in the context of education and resource development includes steps

4.3.1 To make research monies available to the *disadvantaged community* involved in addressing local HCST problems; for example, a pesticide problem, through funding resource needs, i.e. research data collection and interpretation; also through the support of ombudsmen functions, and N.G.O. needs.

Much of western society is largely uninformed with respect to the details of the science and the technology that is delivered to that society. For example, the use of pesticides involves a large number of recently synthesized toxic compounds. The community users and impactees are uninformed with respect to the technology of the substances,

and more importantly are uninformed with respect to the societal position of the use of pesticides; for example, from a societal benefit-cost relationship. The same is true for the impact of science and technology on third and fourth world communities. In all cases, it is essential that technical and scientific data be made available and interpreted for the disadvantaged community. This can be done through research monies to be made available to the community for the technical and scientific advice required.

4.3.2 To make available a resource/research *network* for exploring and developing research projects, including workshops and newsletters, and resource centres (regional); the purpose of such services is to provide that network of education that is required for the *planning, execution* and reporting of individual projects. In this way, holistic research is made more possible. Holistic research is a central objective of HCST research methodology.

4.3.3 To conduct research on the *functioning* (successes and failures) of interdisciplinary teams already in existence in non-HCST areas; for example, Winnipeg has a strongly functioning service/research unit which provides support for community activists and governmental regulators concerning problems of toxicology. It works through direct enquiry, media coverage, and funded research. Working in an interdisciplinary format, there are units which have tested many of the traditional concepts of interdisciplinarity. It is important to find out the approaches that have been successful, so also, those that have failed. In particular, it is important to test the extent of the benefits to be achieved on the inclusion of non-academic participants in interdisciplinary programs.

4.3.4 To conduct research on the *functioning* of existing service and research units already involved in HCST studies; a number of HCST studies have been conducted in the past and many more are underway. Some are in academic situations, many are not. It is important for people newly entering the field to understand the nature of the successes and failures that are encountered.

4.3.5 To establish pilot HCST studies. It is important to provide for

(a) a variety of HCST studies

(b) studies conducted in a simple, uncomplicated, unstructured format.

To these ends, pilot studies are strongly recommended, to test a number of problem topics, leading in subsequent years to studies of substantial breadth and depth, but only if warranted by the results of the pilot studies.

So also, in the knowledge that inter-disciplinary studies require substantial resources and energy to simply hold them together, it is recommended that few large projects of this nature be undertaken in the first year.

4.3.6 To make funds available for *research staff,* as students, secondments, leaves, novitiate resident scholars.

Research staff are essential to HCST studies as in the case of most disciplinary studies. The participation of students is essential. It is important to use full-time professionals and scholars, through secondments and leaves. Resident scholars are of particular importance in many community situations. In these cases a new level of empathetic understanding is frequently required that can be achieved only in this way.

It is important that the work be so structured that the host university is seen to benefit from the conduct of HCST research. In this way HCST participation can be legitimized in the eyes of peer scholars and administrators. This will be particularly able to be done, and welcomed, as universities move out of a period of "restraint"-- as perhaps they are now about to do.

4.3.7 To make funds available *to draw out* from community agencies the areas of research that *they* would like to see developed, e.g. a baseline study on the incidence of cancer as requested by community clinics in Saskatchewan.

It was deemed important that HCST studies be established outside the traditional confines of the "ivory tower". To this end it was agreed that a good deal of attention be given to discovering the wishes of

communities for HCST research work.

5.0 THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY: An Integrated Approach

In what follows, an attempt has been made to integrate and synthesize the ideas and recommendations originating in particular with this workshop as well as the May meeting of the Western Regional Subgroup. The material presented here is specific, takes the form of recommendations and reflects to the greatest extent possible, the principles and concerns outlined in the previous three sections.

5.1 Introduction

The following programme is proposed assuming (a) a limited availability of funds the first year ($5-700,000) (b) an increase in funds during subsequent years to a meaningful level of funding ($3-4,500,000 as a minimum). The programme is suggested considering the following:

- a need to bring together those interested in the field and to expand the network developed in the course of the past regional workshops.
- a need to involve academics with users (the public) (the disadvantaged) and those in industry and government concerned with science and technology.
- the recognition that the field is inter-disciplinary and that the problems with this type of research as experienced by many of us are considerable. They cannot be overcome without special attention to communication, and to both processes and content.
- The first year budget is so small that attempts to immediately fund significant 'research' in the field, of the traditional inter-disciplinary sort, and by conventional granting structures, would not be worthwhile.
- There are regionally constituted problems in this field which make a regional organization appropriate. There are similarly logistic and travel costs to be considered in managing such a strategic grants programme.

- Given communication difficulties between scientists/technologists and social scientists-humanists, as well as between these groups and the public, some effort should be made to overcome any such problems prior to groups working together on detailed or extensive research projects.
- Attempts should be made to both build on existing strengths and at the same time to assume nothing and to build different and innovative forms of expertise. This necessitates identifying existing 'inter-disciplinary' groups* in the field, helping them to expand their expertise and to overcome relevant problems as well as fostering the growth of new groups, teams, associations.
- A need to reorientate scholars, students and the wider public to, in some cases, to the relevance of the social sciences and humanities and, in other cases, to the nature of science and technology.

5.2 Organization and Management of Programme

Each regional and the national association executive shall have a secretariat associated with it consisting of one full-time research assistant and part-time (or full-time) secretarial help. These persons should for the first year be associated with the institutions/departments responsible for co-ordination of regional meetings. At the end of the first year the regional association executive should decide on continuing the secretariat in this or another location.

5.2.1 Structure

- It is recommended that for at least the first two years of this programme management and direction be the responsibility of one national and three regionally constituted associations with overlapping membership reporting and answering directly to Council.

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*Details pertaining to one such existing group are enclosed (Appendix D). It is recognized that many such groups/affiliations/associations can be identified across the country.

- The national association shall consist of ten members, and elect its own chairperson, three members from each of three regional associations (Western Canada, Central Canada (Ontario and Quebec), and the Maritimes) plus representation from Council. Of the ten members, three (one from each region) will be non-academic members, one each representing
  - the general public and public interest groups
  - government organizations, departments and interests
  - industry
- Regional associations shall each have an executive of seven members, at least three of whom will be from the non-academic community. Three of these members, including one from the non-academic community, shall be elected to sit on the national association executive.
- The national association executive shall meet formally at least twice a year; regional associations shall meet at least three times per year and Council shall provide funds for this purpose.

5.2.2 Initiation of Structure

- It is recommended that initially Council advertise the formation of regional associations and invite those who wish to be associated with such groups to contact existing regional co-ordinators within a specified time period. Advertising should be as extensive as possible. Regional co-ordinators should also assume responsibility for publicizing the formation of associations. There shall be a fee for association membership for which members will receive national and regional newsletters and 'voting' rights.
- Association members would then be asked to submit nominations for regional association executives, each nomination requiring three signatures. Regional co-ordinators would then mail forms to all association members asking them to elect members to a regional association.

- It is recommended that regional co-ordinators be association executive members and chair the association for the first year at which time the executive should select its own chairperson. This will hopefully achieve some continuity between this planning phase and initiation of the programme.
- This structure should remain in place for the first two years. of the programme, at which time a decision should be made by Council to continue this form of organization and management as a means of administering and developing an expanded grants programme, or to disband the association and revert to more conventional administration or some other alternative. Should a decision be made to continue this structure of the life of the programme, new elections should take place and be regularized over programme life.
- It is recommended that the entire strategic grants programme be dismantled after seven years and reconstituted subject to evaluation.

5.3 Programmes

The following outlines possible programmes which could be initiated during the first year of funding and augmented during the second year. It is assumed that additional programmes may be added as funding is increased. The national and regional executives are charged with the responsibility of developing ideas for such programmes in the interim.

Programmes are divided into those for national administration and those for regional administration. It is understood that, given the nature of the programmes, the composition of the executive bodies and the initial low level of funding, executives will be responsible for adjudication in the case of awards and will solicit advice from individuals external to the executive where deemed appropriate.

5.3.1 National Programmes

5.3.1.1 Newsletter and national publications

The national association will be responsible for publication of a national newsletter to highlight features of the regional newsletters,

and communicate matters of national importance. This newsletter shall be of a more scholarly nature than regional newsletters, shall contain brief reviews of articles, books, upcoming events, other networks and original articles. Attempts should also be made to integrate material with and to inject material into existing publications as, for example, has been the case with Conserver Society Notes and Alternatives Magazine. The research assistant of the secretariat to the national executive will act as editor and be responsible for national publicity as well as liason with regional editors and other publications.

5.3.1.2 Fellowships

The national executive shall oversee and adjudicate with the assistance of its secretariat and existing Council staff the awarding of fellowships under a new programme which will make funds available to those students from the natural and engineering sciences wishing to pursue graduate degrees in the social sciences or humanities.

Awards will be made at the master's and doctoral level and will be limited to $4,000 - $6,000 per year/ per award on the basis of academic ability, and a proposal for research which demonstrates relevance to the HCST field.

5.3.1.3 Secondment Programmes

Under this programme existing research teams with an inter-disciplinary focus would be awarded funds which would allow them to acquire for a six-month period expertise in the humanities or social sciences which would allow them to expand their scope.

Research groups must demonstrate the relevance of their activities to the HCST field, and deal with the integration of the social sciences and/or humanities into research activities to satisfy the executive that such research is relevant and truly inter-disciplinary. Preference will be given to those groups or teams which currently include or involve the public at large in research or related activities.

This programme will award research groups salary for up to a six-month period to a maximum of $1600/month plus expenses up to $2500 for the six-month period.

The research assistant of the secretariat will be responsible for liason with the team, putting them in touch with regional associations where relevant and thereby involving them in regional workshops (described later) wherever possible. The national research assistant will also co-ordinate evaluation of the involvement of the researcher in the existing group or team.

In this manner Council funds will compliment existing research activity, recognizing that initially adequate funds are not available for separate and additional research programmes.

5.3.2 Regional Programmes

5.3.2.1 Resource Development Programme

This programme, to be administered by the regional associations, will consist of approximately six workshops to be held at two month intervals the first year of the programme. This may be expanded as more resources come available.

Workshops will deal with 'real' problems in the science/technology/human interface and will bring groups of people together either on one occasion or on an ongoing basis to define problems, present material and work toward 'paper' resolution of these problems. Workshops will be the responsibility of the regional executive with details and organization being the responsibility of the secretariat.

Workshops will include representatives of public groups concerned with that specific area as well as academics in both the humanities, social sciences and natural sciences and engineering. Workshops will be properly designed and implimented in order to explore process issues as well as specific content. The regional research assistant should probably be someone with considerable expertise in workshop design and operation.

Workshops, in addition to exploring subjects and relevant processes, will also be intended to expand the scope, knowledge and expertise of participants.

Results will be written up in regional newsletters. Those groups receiving secondment grants will be encouraged to or have previously

participated in such workshops.

5.3.2.2 Newsletter

Regional newsletters will be edited by the regional secretariat. They should be in 'populist' form and less formal than the national newsletter intended for the wider public, academics and those in government and the private sector. Submissions on the HCST topic should be made to other existing publications and as much publicity as possible sought for the total programme.

Newsletters will deal with regional interests, events and ideas.

5.3.2.3 Directorate

Each region will be responsible for the production of a directorate indicating persons, groups, organizations, associations within the region interested in various aspects of the human context for science and technology. This will include academics, government and public agencies and their current activities, 'modus operandi' and other relevant information.

The directorate is to be completed during the first year of the programme, published and made available to association members among others.

5.3.2.4 Exploratory Grants

These grants will be administered locally and will be available to individuals or small research teams with preference given to those who wish to collaborate in exploring particular problems relevant to HCST. Some priority will be given to those who, by participating, wish to extend their knowledge, skills or experience. Individuals or small groups would also be expected to relate to public, government and corporate bodies. Funding will be given for

- problem definition
- examination of historical roots
- articulation of relevance of problem to society and social futures
- speculation on steps meaningful for resolution and their justification
- some indication of probable resolutions supported by documentation and logical argument.

Recipients would be expected to pursue funding for more detailed research in these areas once adequate funding programmes are developed. Recipients are also expected to contribute their particular problems and experiences to regional workshops.

5.4 Budgets

The following budget is clearly hypothetical but gives some idea, relevant to these programmes, how some \$500,000 - \$700,000 might be spent the first year. This is subsistance level funding for such a programme. The hypothetical budget is developed recognizing that programme administration costs may be in addition to the sum mentioned. However, since this programme assumes some organization and management at regional levels outside of Council, allocation is made for secretariat costs. Costs of regional and national meetings would presumably be borne by Council.

5.4.1 National Budget (first year operation)

- Secretariat
  - Research Assistant . . . . \$ 24,000
  - Secretarial 12,000
- Newsletter 15,000
- Fellowship Programme
  - Master's level 45,000
  - PhD level 60,000
- Secondment Programme
  - Fifteen at \$8,000 (average) 120,000
- Budget assumes travel for research assistant + materials + supplies + administrative costs of national executive borne by Council.

TOTAL NATIONAL BUDGET. . . .\$276,000

5.4.2 Regional Budget (first year operation)

- Secretariat
  - Research Assistant . . . . \$ 24,000
  - Secretarial 12,000
- Resource Development Programme
  - Six to eight workshops @ \$2500 each . . 20,000

• Newsletters	$ 6,000
• Directorate Production	5,000
• Exploratory Research Grants	
Eight at $5,000 (average)	40,000
• Travel costs of research assistant. . . .	7,500
• Materials and supplies	8,000
TOTAL REGIONAL BUDGET	$ 122,500
THREE REGIONAL BUDGETS	367,500
TOTAL PROGRAMME BUDGET (First Year)	$ 643,500

5. Rationale

The proposed programme is an attempt to integrate the concerns and needs identified by working groups attending both western regional meetings into a specific programme proposal for Council. It is to be understood that this effort represents an attempt by the regional co-ordinator and is subject to review, debate and counter suggestion by the emerging Western Canadian community of interest.

In addition to attempting to encorporate the features outlined at the outset, this proposed programme depends heavily on a new national and regional structure. There is strong feeling that adjudication and management of such a programme as the HCST cannot be done by traditional processes developed by Council. Inter-disciplinary work necessitates review by a cohesive functioning group representing many different disciplines and interests. The traditional process of isolated peer review within disciplines cannot be used. Many participants are currently unhappy with Council's apparent inability to handle applications for work in inter-disciplinary areas, reviews of proposals often being done from disciplinary perspectives which are clearly inadequate and inappropriate. Furthermore, a community of interest must be developed. The close-knit, multi-disciplinary regional and national association executives with responsibility for adjudication and programme management are suggested for these two specific reasons in addition to others listed.

Funds are not divided into smaller parcels for distribution (i.e. $3,000 here and there) because such small amounts are unlikely to do anything be it supporting a student or promoting research. The 'secondment' programme builds on existing strengths and therefore uses funds to supplement existing activity. Other proposed programmes similarly involve larger sums. There is at the same time opportunities and funds available to a larger community through the newsletter, participation in workshops and involvement and interest in the work of regional communities. The wider community will therefore likely be 'affected' by one or more aspects of this programme.

THE UNIVERSITY OF CALGARY

2500 University Drive N.W., Calgary, Alberta, Canada T2N 1N4

KANANASKIS CENTRE
FOR ENVIRONMENTAL RESEARCH

Telephone Campus (403) 284-5271
Telephone Kananaskis (403) 284-5355

1980-10-14

Dear Participant:

Please find enclosed a draft copy of a report I have prepared using the material generated at our last regional meeting, the material from the first regional meeting and your various contributions in written and verbal form. I wish to point out the relative importance of section 5 of this report. It is my attempt to design a specific programme in response to the ideas, concerns, and interests that have emerged. However, please note that what is contained is a mere skeleton of what must be detailed for such a programme, the background material and the input of regional representatives at the national meeting supply much of the 'meat' for the bones I have proposed.

It is therefore important that, should you disagree with what I have proposed or wish to re-articulate the points made, that you should contact me before the end of the month. I would prefer a written response but should you feel pressed by time you may wish to speak with myself or provincial representatives by phone. In this case, you may wish to convey any additional input to the provincial co-ordinators or myself.

Pat Sloan, Government of British Columbia 604-387-3707

Douglas Norrie, Mechanical Engineering, University of Calgary
403-284-5787

Frank Tester, Kananaskis Centre, University of Calgary
403-284-5355

Carl Ridd, Religious Studies, University of Winnipeg
204-786-7811

Cameron Blatchford, University of Regina 306-584-4161

I recognize that I have become very specific in what is proposed in this document. It is probably not the only way to encorporate your concerns and clearly encorporates some better than others. In 'sticking my neck out', I have also tried to keep in mind the political and other realities associated with any proposals which go forward to Council. I trust I have not misrepresented you and have steered a reasonable course among our various concerns.

I would also like to take this opportunity to thank you for

demonstrating your interest in this process. The national meeting will be held October 31, November 1 and 2 at St. Mary's, Ontario and the final recommendations to Council will be forthcoming thereafter.

In closing, I again express my appreciation for all your efforts, sincerely hope that we will have the opportunity to interact again as a programme develops and encourage you to 'drop by' the Centre at any time. Those of you who enjoyed this setting might consider the possibility of using the site for summer intensive courses or workshops. The Centre's facilities are open to all Universities in Canada for such purposes. Should you wish to use the facilities, please let me know.

Best regards,

Frank Tester
Regional Co-ordinator

FJT/gl
Encl.

The University of Calgary
2920 24 AVE. N.W.
CALGARY, CANADA
T2N 1N4

KANANASKIS CENTRE
FOR ENVIRONMENTAL RESEARCH

Campus (403) 284-5271
Kananaskis (403) 284-5355

WELCOME TO THE KANANASKIS CENTRE

For many of you, this will be your second visit to the Centre. The Centre and its staff welcomes you and our 'first time' participants to this unique location and we trust you will find the setting conducive to meaningful communication, sharing, and the exchange of views and ideas on this most challenging of topics.

BACKGROUND

This meeting is the second and final regional workshop prior to a national meeting to discuss the establishment by SSHRC of a new strategic grants programme, the 'Human Context for Science and Technology.' The first meeting dealt substantially with the subject, its scope, depth, priorities and problems. We developed justification for working in this area, discussed the potential content in terms of research and research areas, strategy and took preliminary steps toward developing a 'modus operandi.' This workshop concentrates on the latter, expanding it in order to develop a full set of recommendations and a position to be presented to the national meeting prior to submission to Council.

The material generated in the process has been extensive and has broadened the perspective of all of us involved. With this better understanding of issues, concerns, problems, the nature of the field and potential participants we should now be able to design aspects of an effective programme to consider the Human Context for Science and Technology.

My sincere thanks to all who contributed written material. Going through it has been a valuable education for myself as co-ordinator as I am certain it has been for all of us as participants.

PURPOSE

The purpose of this workshop is therefore to develop as full and comprehensive a set of recommendations for Council as possible with respect to the (a) objectives, (b) design, (c) management and (d) operation of a strategic grants programme focussed on the Human Context for Science and Technology.

The following list represents my attempt to synthesize major areas and concerns as identified in your papers, from our previous discussion and in response to my perception of Council's needs and requests at this stage.

We appear to have done our job well to date. Council has accepted in principle the need for activity in this area. Therefore we are not as concerned with 'justification' as was previously the case. We will hopefully, on this occasion, combine our enlarged understanding of

'research and research areas' with the preliminary work done on 'modus operandi'* to produce a very complete set of recommendations for Council.

CONTENT

I am proposing the following as the focus for this workshop, recognizing that it is subject to your modification. I propose that we self select into three working groups, that these groups and the total group interact over the next several days and that each working group produce a complete set of policy and programme recommendations in their respective area. The task is demanding of our creative imaginations and ability to effectively communicate. I therefore respect your criticism of the format associated with this content as there may be better ways of 'doing the job.' There are three areas we need to address.

Communications:

- Objectives of programmes, aimed at facilitating communication?
- How should Council implement these objectives?
    - newsletters/publications
    - association(s)
    - conferences/workshops
    - resource centres
    - television/radio/newspapers
    - academic community/general public
    - national debate/enquiries
    - travel/exchanges
    - innovative ideas/role of performing arts/ displays/travelling programmes
- Keeping in mind the real world and limited budgets what priorities are assigned to what aspects of 'communications'?
- Who should do it? From where should it be done? How should various efforts, programmes, interactions be organized?
- What is your rationale for these positions?

Education and Resource Development:

- Objectives of programme(s) aimed at facilitating education and resource development?
- How should Council implement these objectives?
    - fellowships/leaves/scholarships
    - eligibility
    - academics/students/private sector employees/government personnel

* see the Report of the First Meeting, Western Regional Subgroup, "The Human Context for Science and Technology, May 22-24, Kananaskis Centre, University of Calgary, Draft.

- participation in research
- institutional changes in university community
- public education
- exchange programmes/apprenticeships
- role of industry/government
- criteria for award

- Should awards be decided by national or regional bodies? By whom? Chosen how?

- Should educational programmes as well as individuals receive awards? Would this encourage more holistic programmes within universities?

Research Programmes

- Objectives of various research programmes?

- How should Council implement these objectives?
  - small exploratory grants/ceilings
  - larger research grants/ceilings
  - criteria for selection
  - joint ventures/academics/private sector/government/public
  - qualifications of teams
  - regional decisions *vs* national decisions
  - funding of individuals/groups
  - regional *vs* national problems
  - trouble-shooting
  - evaluation

- How should Council allocate limited funds among different programmes?

- Interdisciplinary research is difficult, often degenerating into interdisciplinary work only in the mind of the researcher(s) or degenerating into chaos, confusion and circular debate. Should there be a 'trouble-shooting' team to assist projects when problems arise? If so, who? With what terms of reference?

FORMAT

I am proposing that we constitute three self selecting working groups to tackle each of the areas identified above. Recognizing that they are not mutually exclusive, I propose interaction among subgroups and discussion by the group as a whole. Furthermore I can think of three larger issues which do not easily fit any of these three areas and which should be dealt with by the group. There may be others. These include:

- programme length
- programme evaluation
- relationship with other groups/programmes/organizations.

RESOURCES

Please note the wealth of written material available for those who did not receive everything by mail. In particular I refer you to:

- *the draft of the first meeting, especially the section 'modus operandi'*
- *the position paper prepared for us by Alan Fox of Council*
- *Cliff Hooker's memo of August 8th, 1980*
- *additional material prepared for us since the last meeting by:*
  - *Ed Abramson (memo of July 24)*
  - *Ben Smillie*
  - *Michael Robinson*

Extra copies of these materials are available.

Participants

Ed Abramson, Victoria, British Columbia
Willard Allen, Associate Vice President Academic, University of Alberta
Cameron Blatchford, University of Regina, Saskatchewan
John Brown, Consulting Sociologist and Engineer, Vancouver
Terry Burrell, Victor, Burrell Associates, Toronto
Albert Comonar, Brentwood Day, British Columbia
Harold Coward, University of Calgary
Park Davidson, University of British Columbia
Nick Dormaar, M.D., 130 Mile House, British Columbia
Fulton Fisher, Department of Biology, Simon Fraser University
Alan Fox, SSHRC staff
David Godfrey, Department of Creative Writing, University of Victoria
Mark Guslits, Architect, Winnipeg, Manitoba
Harry Habgood, Alberta Research Council, Edmonton, Alberta
Loren Hepler, Department of Chemistry, University of Lethbridge
Gordon Hodgson, Kananaskis Centre for Environmental Research, U. of Calgary
Evelyn Jonescu, Great Canadian Plains Research Centre
Don Kerr, Department of English, University of Saskatoon
Don Keu, University of Saskatchewan
Sam Kounosu, University of Lethbridge
Frank Labelle, Winnipeg, Manitoba
Henry Lorenzen, Architect
Jim McCrorie, Department of Sociology, University of Regina
Tom Mallinson, Department of Communications, Simon Fraser University
Douglas Norrie, Department of Mechanical Engineering, U. of Calgary
Alexander Rathay, University of Manitoba
Carl Ridd, Department of Religious Studies, University of Winnipeg
Michael Robinson, Petro Canada
Martin Samoiloff, Department of Biology, University of Manitoba

Arthur Schafer, Department of Philosophy, University of Manitoba

Vere Scott, IDEA Centre, University of Manitoba

Pat Sloan, Ministry of Industry and Small Business, Government of British Columbia

Ben Smillie, St. Andrew's College, Saskatoon

Frank Tester, Faculty of Social Welfare/Kananaskis Centre for Environmental Research, U. of Calgary

Tim Tyler, Faculty of Social Welfare, University of Calgary

Ian Vertinsky, Faculty of Commerce and Business Administration, University of British Columbia

This list is exclusive of those who did not attend either workshop but with whom correspondence has been ongoing.

The following outlines the activities of the Inter-disciplinary Toxicology Group at the University of Manitoba. While inter-disciplinary in the sense that disciplines within the 'hard' sciences are involved, it stands as an example of the sort of programme that could benefit from social sciences and humanities input.

The following was outlined by Dr. Frank LaBelle, Department of Pharmacology, University of Manitoba.

Current activities include:

1. information production and public education
   (a) direct requests
   (b) media
   (c) aid to special groups (i.e. injured workers, farmers, etc.)
   (d) school programmes
2. advise government on matters relating to toxicological problems
3. chemical crisis management
4. inter-disciplinary training
5. data and literature file compilation
6. seminars
7. basic research on mechanisms and therapy of toxicity

Expansion could involve, for example:

1. economists interested in cost/benefit and risk analysis
2. legal profession
3. city planners
4. physicians -- education on links between chemical pollutants and illness
5. trainees from government, general public
6. public groups to inform and help make them aware of information relevant to their role in pressuring government and ensuring the health and welfare of their communities

MONTREAL REPORT

Acknowledgements

The authors wish to thank the participants of the Montreal Conference for the confidence they placed in us when they mandated us to articulate this alternative proposal. We particularly acknowledge the help of Ursula Franklin, Beatrice Olivastri and John Abrams with whom we consulted while preparing the conference, and Ursula Franklin, John Abrams and Richmond Olson who commented on the preliminary manuscript. We apologize to the other participants for not having been able to consult with them but the deadline imposed by the National Meeting in St. Mary's has made that impossible. We had hoped that the vision for the field as set out in this report had received earlier recognition and that as a result we could have developed it together with adequate time and resources. Under the circumstances, this report is the best we could manage and we hope we have not disappointed the deep confidence they placed in us.

Jean-Claude Guédon
William H. Vanderburg

THE PROBLEMS CREATED BY SCIENCE AND TECHNOLOGY: A TARGET FOR STRATEGIC FUNDING

1. INTRODUCTION

The Montreal meeting of October 10 and 11 emerged as an additional step in the decision-making process initiated by the Social Sciences and Humanities Research Council (SSHRC) in the area of strategic grants, and specifically what has been called the Human Context for Science and Technology (HCST). After a national meeting held near London, Ontario, November, 1979 a number of regional meetings were held in the West, in Ontario and in the Maritimes.

For some of the participants at the first meeting, the logic behind the organization of the decision-making process remained obscure, and they felt that "substantive positions" were more important (and interesting) than regional positions. As a result, a different kind of meeting was negotiated with SSHRC representatives, Alan Fox and Maureen Woodrow in the summer of 1980, and the Montreal meeting is the result of these negotiations. This meeting cannot (and should not) be equated with a regional workshop, and in particular, it does not attempt to represent Quebec in any manner. The origin of participants (from across Canada) and the very small number of people from Quebec should preclude such an erroneous interpretation of our meeting in Montreal. On the other hand, we have not heard from any Quebec regional meeting and hope that people from Quebec will be included in the final consideration.

The aims of the Montreal meeting were to undertake a critical review of the evaluation to date as to the feasibility of making HCST studies

a target for strategic funding and to develop an alternative proposal to SSHRC. At the meeting were present both people who had agreed to attempt to work out this alternative proposal as well as people who primarily represented prior regional meetings, the national co-ordinating body of this operation and SSHRC. Although some people actually played both roles and although some attempts were made to break loose from role-playing, on the whole, most discussions carried on in this meeting divided participants along the lines just outlined.[1] No consensus emerged from the meeting, except that those who had previously played an organizational role in the review process seemed to agree among themselves that they could not understand the nature of the <u>differences</u> which characterized this particular meeting from the previous regional meetings. However, certain inadequacies of the analytical structure emerged.

Such a situation was not very conducive to bringing out policy recommendations, since there must be a fairly wide agreement before they can be stated with some clarity. Consequently, this report will not try to reflect what actually went on in the Montreal meeting. Instead it will carry out once more the mandate the two chairpersons received from the participants to delineate a position which seems to have been largely ignored or obfuscated in the process of identifying and recommending modes of funding the HCST field.

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1. Role inversion (treating oneself as a person, not as a representative of something) was proposed several times by Richmond Olson, but with little success.

2. HCST: A CRITICAL EVALUATION OF WHAT HAS BEEN DONE TO DATE

2.1 The St. Mary's National Conference

The authors of the present text well recall the major thrusts of the discussions in St. Mary's in November 1979, and they feel that Clifford Hooker's Preliminary Report (to be referred to as P.R. in this report) does convey part of the flavor of this meeting. Problems of emphasis do arise here and there, as well as problems of faithfulness, but synthesizing a set of largely amorphous discussions necessarily leads to these difficulties. Given the time constraints (the reasons for which were never explained but apparently came from Council itself) and the complexity of the task, Hooker did a creditable job, and many readers of his report have even pointed out its quality. Indeed, rather that recriminate against this or that detail, we would rather underscore the opportunities which were inherent in this report, but which were progressively lost as the review exercise proceeded.

Apparently, Hooker's report was supposed to achieve two goals: prepare a programme for the assessment of research priorities in HCST and involve the relevant research community (P.R., p. 3).

In response to this request, P.R. dealt with a "snapshot" of the field, its historical setting and why it should be studied and funded. The nature of the field was then explored in more detail (P.R. Part III) and possible themes and issues were related to this analysis. Finally institutional structures were discussed so as to foster research in the area.

The reading of P.R. is very instructive, especially if its main elements are summarized in point form so as to reveal the structure of the argument:

1) The "fogginess" of the operation: "We are somewhat in the position of discussing goal oriented research without a clear goal having been delineated" (P.R., p. 5).

2) The "fogginess" of the field: it seems to address the threat of an all-pervasive science and technology, by leaning on one hope: there is a "...consciousness of design...unique to this century" (P.R., p. 10)

3) The fogginess of the relevant research community, coupled with the relative absence of practitioners of such important disciplines as history, philosophy or sociology of science and technology (P.R., p. 5).

4) The fogginess of the "impacted" people (P.R., p. 5).

5) The fogginess of the objectives to be achieved: is the aim to improve a <u>Canadian research capacity</u> or is it to promote some specifically Canadian questions or issues?

6) The clarity of the danger: there is an "...urgent historical need, (1) for adequate intellectual tools to handle the assessment and management of our public, science and technology based actions, (2) for adequate institutional structures to choose wisely political and social assessment and management of policy choices, and (3) for adequate theories and institutions for controlling or managing the societal consequences of deploying the resulting techniques and technologies." (P.R., p. 9, 10) In the end, "...what is at stake is nothing less than the future of human beings on the planet..." (P.R., p. 11).

All this adds up to the following: there are substantial dangers associated with science and technology, there exists a potential field of study which could coalesce with sufficient funding; if SSHRC can be convinced that this field can save man from the dangers associated with science and technology, then it will be funded and can hope to coalesce into a real entity. Meanwhile, of course, its ability to help humanity remains a pious wish precisely because no one knows -- and Hooker's report points this out clearly -- what this entails. The vicious circle inherent in this reasoning is readily apparent and it is probably what Gail Stewart meant when she warned all of us not to become part of the disease in trying to "cure" it (see the important paper she submitted for the National Conference of 1979).

All this is very curious -- so very curious in fact that it may be wondered whether the problems encountered by the "field" are not artifacts of the process used to approach it. If we recall that the people present at St. Mary's, by and large, did not belong to any of the disciplines or sub-disciplines dealing with science and technology, and if we add that the choice of these people was not systematic at all, so that each one could only illustrate (at best) a viewpoint (to take up Richmond Olson's excellent term which surfaced in Montreal), it may not be surprising that so much "fogginess" emerged. As Roger Cooter (Atlantic Region Report, Appendix A) pointed out: "From the discussion at the Workshop one would never have guessed that there exists an extensive body of deeply reflective literature on the sociopolitical nature, meaning and origins of modern science and technology."[1] But was this ignorance

1. Ironically, the same author deplores the absence of any centre in Canada devoted to these questions, which reflects his (surprising) ignorance of the activities of, for example, the institut d'histoire et de sociopolitique des sciences at the Université de Montréal.

not a result of the way in which the whole question was approached? Was it not also a useful ignorance since it often appeared not as ignorance, but as novelty? And novelty is an essential element in the choice of fields to be funded under the Strategice Grant Programme. Strategic grants are not supposed to fund anything that can be adequately funded in some other way. But as Roger Cooter pointed out: when he asked what kinds of projects could not be funded under already existing programmes, he "was greeted with what might be called a reluctant silence..." (Atlantic Region Report, R. Cooter, Appendix A). People who asked similar questions at other meetings encountered much the same reaction.

All this leads to one conclusion at this stage of our inquiry: the HCST field as a new entity is largely an artifact created by the potential availability of money. To explore this thesis further, we will take a look at how the evaluation process was continued after the first National Meeting.

2.2 The Shift to the Regional Format

P.R. is also interesting by the emphasis it places on intellectual concerns. When Hooker writes "Themes are neither conceptualizations of a field nor a catalogue of acceptable research projects within it; they are foci of interest and commitment..." (P.R., p. 19), he actually points to the need of going beyond the mere recognition of concerns, worries and so on, especially if one is to assess research priorities. In other words, he underlines the great need for a reflective or conceptual approach to this (would-be) field. Once again, it could be pointed out that many starting points already exist (e.g. those mentioned in Roger Cooter's bibliography), but, for the moment, let us act as if we really faced a tabula rasa.

Hooker's concern for the intellectual structuring of the field shows up further when he asserts that "HCST is inherently interdisciplinary in nature and can only effectively develop through extensive, co-ordinated interactions among those involved" (P.R., p. 28), and his second recommendation corresponds exactly to this assertion[1]: "The principle (sic) aim of this support is to foster and extend relations among researchers with commitments in the HCST field" (P.R., p. 29).

The <u>nature</u> of the relations between researchers is not specified, but context as well as reference to interdisciplinarity seems to indicate that <u>intellectual</u> relations are meant here. The point is not entirely facetious, as it turns out that geographical contiguity was eventually substituted for intellectual affinity under the name of regional workshops. But what is remarkable is that the notion of <u>regional meetings</u> and of the need for them is nowhere to be found in P.R. On the contrary, to the extent that P.R. seeks to bolster the social foundations of HCST, it does so in unambiguously intellectual terms: "It is important to build networks of scholars with <u>related interests</u> so that <u>coherent</u> and sustained work may proceed" (P.R., p. 29, our emphasis).

It could perhaps be argued that related interests could rest on regional concerns, but, in this regard, it is very instructive to examine the role of regionality in the three regional meetings which ultimately developed (West, Atlantic and Ontario).[2]

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1. We note in passing, that P.R. never defines interdisciplinarity, and thus takes it for granted. It does not demarcate it from trans or cross disciplinarity either and this makes some significant theoretical and methodological problems invisible.

2. Apparently Council or its representatives were unable to find anyone wanting to organize a regional workshop in Quebec, although it is probably the most obvious "region" of all. How this may be interpreted and how this affects the validity of the other regional workshops is left to the discretion of the reader.

Ontario is the simplest case of all. Regionality is never considered as a viable base for the different kinds of problems envisaged in the Ontario workshops. Regionality appears only fleetingly as a principle guiding the choice of people who will have to evaluate research proposals. How the intellectual content of a research proposal is related to the regional origin of the assessors is never explained. And if there is some real connection between theoretical stance (needed to evaluate the projects) and regional origin, we may wonder how the members of any panel can really agree among each other at an intellectual level. In short, for Ontario participants, regionality is an aspect tacked on the rest of the exercise that went on there, and, in fact, it definitely appears that without an explicit regional structure of the meeting, no regional principle of representation would have emerged (as indeed it did not emerge at St. Mary's in 1979). In other words, regionality is an artifact of the procedure used to gather people in one place. Had disciplines been used, disciplinary representation would have presumably emerged instead.

The case of the West and of the Atlantic region are a little more complicated but ultimately lead to similar conclusions. In both of these cases, a minority of participants dealt with regionality in their papers (e.g. MacCormack's address to the Atlantic Region Workshop, Pobihuschy's paper on the family farm in New Brunswick, George Sanderson; in the West Abramson's paper attempts to define the specificity of the Western Region, as does Gordon Hodgson). But what is interesting is that none of these references to regionality can be said to be true intellectual constituents of the HCST field, however it may be defined.[1] For example, George Sanderson talks of regionality because he thinks that this would increase the efficiency of potential actions emerging from HCST studies.

1. It can be further noted that the West refers to only 3 regions (West, Centre, East), where Ontario and the Maritimes see 4.

Pobihuschy's study of the family farm in New Brunswick could be easily extended to Quebec and Maine, and, besides, New Brunswick is not a region, but a Province. In the West, Abramson tries to delineate a western specificity, but the variables adduced to achieve this aim (friendly attitudes of Westerners, space, paranoia, etc.) are not clearly relatable to HCST. At least Abramson does not demonstrate how he would incorporate them into an HCST study. Gordon Hodgon, on the other hand, clearly deals with local questions because they are easier to study, but he does so in order to relate them to wider questions, thus showing that a local approach (which may not have anything to do with a region) can be relevant for the study of larger theoretical frameworks.

Actually, John MacCormack is the only one who tries to delineate a relationship between region and the HCST field and his failure is all the more interesting in this regard, By appealing to historical factors such as belated and limited industrialization, he tries to demonstrate that the intuitive notions we may harbour about the cultural unity of the Atlantic region is more than an intuition and that it affects the place occupied by science and technology with regard to human beings. But his conclusion seems rather weak with respect to the efforts he spends on defining the region. First of all, his definition of region could include many areas in the world left largely untouched by large scale industrialism, hence we have avoided the ills of industrialism, and hence we have in ourselves the answers to industrialism. All that is needed is to express it clearly for the world to understand that our apparent backwardness actually is a blessing in disguise. Presumably, people convinced by MacCormack's argument should now demand the deindustrialization of their own locality. As for his reference to <u>community</u> as the distinctive

basis of the Atlantic region, it may well be correct, but this does not answer HCST's concerns unless he shows how community structure suffices to define (and limit) a region, and how a community structure modifies scientific and technical activities or developments. It should be added in this regard, that MacCormack's concept of community refers to an abstract of sociology and not to the experiential sphere of individuals.[1]

But what is even more significant in MacCormack's paper is that it is the only one of this kind. How curious that only one person should take seriously the problem inherently set up by the regional structure of the meetings. How interesting that he should fall in producing questions susceptible of creating a logical link between region on the one hand, and science and technology on the other. Of course, his task was difficult: regional workshops were supposed to respond to Hooker's Preliminary Report, which report, as pointed out before, did not lead at all to a regional approach.

The problem lies with the notion of regionality itself. Regions are political artifacts which have been designed largely to respond to feelings of alienation felt in the West and in the Maritimes. It is not by chance that regionality was not addressed at all in Ontario: Ontarians are very much at the hub of the country. The West and the Maritimes, on the contrary, want their due share of resources and this is where regions become useful tools. And this is confirmed by the fact that almost all references to regionality are expressed in terms of involvement, of efficient local action, of human context for research, and so on. Regionality, in other words, is an instrument to defuse potential resentment and resistance to the centrality of government in general.

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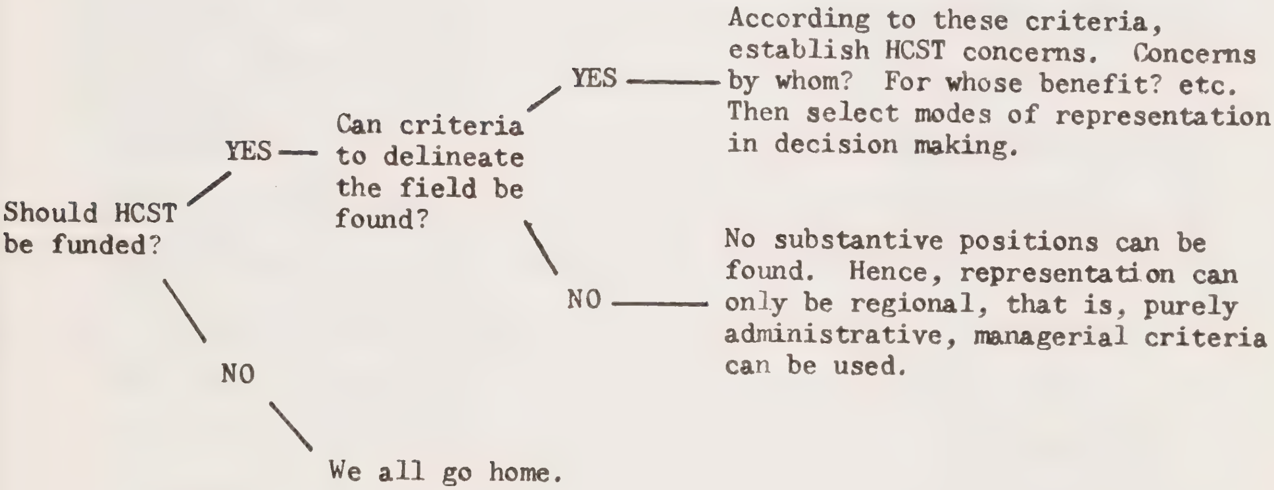
1. This point was made by Richmond Olson.

In summary, this part of our argument should clearly demonstrate that the passage from the national to the regional meeting bears no relationship to the constitution of a field; instead, it bears a deep relationship with its eventual <u>management</u>.

2.3 Accounting for the Shift to the Regional Format

At this stage of our argument, we would like to introduce a useful diagram first proposed by Jennifer Smith at the Montreal meeting and then amended in the course of our discussions. It takes the form of successive questions.



Proposed Modified Diagram

As Jennifer Smith pointed out, the bottom path, based on the impossibility of delineating the field, leads to a substitution in organizational principles of the field. Instead of organizing the field on the basis of some intellectual considerations, form is substituted for content and principles of representation are used which, in fact, could have been taken from other situations without any need to consider the specificity of HCST. In this case, the granting agency does not need to consult the research community on substantive or content issues. Organization charts would have sufficed. The question then is: Will these organizational forms bias the content of HCST or will they be instrumental to developing a content?

Considerable effort was spent in Montreal to demonstrate this to be the case, but those who came as representatives of prior operations or of SSHRC claimed that they could not understand these arguments. The most heroic effort to convince this group that something was deeply wrong was expressed by Richmond Olson when he suggested that lack of understanding of a position could not be equated with an assumed triviality of the said position. In other words, it appeared to the authors of this text that Richmond Olson was trying to say that the burden of proof did not rest on the shoulders of those voicing critiques, but on those who were about to establish policies and thereby act (and impact) a number of people in the research community.

But even if the burden of proof would rest on SSHRC's representatives, it is only fair to try and help them in delineating as clearly as possible the concern expressed with regard to the question of intellectual biases introduced by management structures. We address this question with deep seriousness and hope that it will be treated with equal respect by SSHRC's representatives.

Participants to regional workshops generally do not voice any hostility to larger theoretical questions, quite the contrary. Likewise, national organizers of this whole procedure have no quarrels with the development of theoretical stances. For example, Alan Fox expressed this very point at least once in the Montreal meeting. So our analysis clearly eschews any conspiracy theory, which would constitute a very weak approach in any case.

If we look at this whole review exercise of HCST for what it has become -- namely not so much an intellectual exercise as a process aiming at establishing a managing structure within SSHRC, then it becomes important to scrutinize the inner workings of this structure. Our task is complicated by the fact that we only have proposals and not actual working structures. Nevertheless, the whole development of this review operation has brought to light a number of tendencies which, presumably, will only develop as time goes by. We have seen, in particular, how progressively form came to replace content, how limited problems came to replace the study of social problems related to science and technology analyzed from distinct theoretical frameworks.

Now, let us suppose that review boards be indeed set up on the basis of regional representation. Let us further suppose that someone with wider concerns submits a research project to such a board. Finally imagine that the research project could be presented so that the board would have no inkling as to its geographical or institutional origin: only the research project arrives and the board can only deal with the content of the proposal. Now we have a very curious situation. If regionality is indeed a crucial element to account for the intellectual structure of HCST, as the proposed review procedures seem to imply, then members of

the board have great difficulties to talk to one another and they cannot relate to a theoretical project which is pure content; if, on the contrary, the regional origin of the members of the board does not influence their intellectual attitude, then one wonders why regionality is used at all.

Of course, in practice, things do not work this way. Research projects never appear, as pure content and regional representatives are also representatives of disciplines, political viewpoints, institutions, sex, etc. ...Because of this multiplicity of identities meshing within one individual, dialogue does go on and precisely because content can rarely, ifever, be addressed directly (peer review is already exceedingly difficult within well structured disciplines), other variables become important to adjudicate funds to individuals or groups: Merton's Matthew effect adds to regional justice and other kinds of justice, all in the name of supporting the highest and most exacting standards of research. But in the end, what prevails is a kind of distributive justice which is easily reconciled with political concerns, but not as easily with intellectual and/or social concerns. It can be said that the regional structure does not directly impede the development of theoretical work, but neither does it favor it.

3. AN ALTERNATIVE PROPOSAL

3.1 Introduction

Nations all across the globe are facing problems that are directly or indirectly related to the roles science and technology play in shaping our future. Canada has its share of these problems, and it is necessary and urgent that steps be taken to study them more intensively for the purpose of finding solutions. It is in this perspective that the action of the Social Sciences and Humanities Research Council to consider these problems as a possible area of concern, is most appropriate. We then find ourselves with the task of advising Council how to implement a strategic funding programme in this area.

3.2 A Variety of Perspectives

Unlike a previously established national area of concern, namely aging, there is little consensus about the problems posed by science and technology. On the one end of the spectrum, we find people convinced that science and technology create problems that pose a fundamental and radical threat to human and other life on this planet and that we must rethink our future. In their view, the problems cannot be resolved by the same science and technology which caused them in the first place, because they create a pattern in which the solution to one problem creates other problems which are then solved by solutions which in their turn create still other problems. This spiral is seen as drawing us to the brink of disaster. These people advocate a new vision for the future in terms of a conserver society, for example.

The above spectrum needs to be complemented by yet another. On the one end there are those perceiving themselves as "doing the impacting" by

participating in and identifying with the scientific and technological decision-making processes, while on the other end there are those perceiving themselves as "being impacted upon" without being able to do anything about it, resulting in a sense of helplessness in the face of the "system". Whatever other variables may contribute to the variety of perspectives, it is obvious that these outlooks affect a researcher's problem choice, methodology and the interpretation of the findings as well as the evaluator's assessment of a submitted research proposal. These differences must be taken into account.

Does this imply a complete relativism in the field? We believe the danger exists if specific problems are studied in isolation from each other. We believe, however, that when this is not the case, the range of possible perspectives is reduced and that a relationship can be established between the perspective of those "doing the impacting" and those "being impacted upon" which, of course, does not eliminate the differences in perspective. But the problems created by science and technology can only be examined in relation to each other if we can establish their theoretical relationship as deriving from the complex pattern of interaction between science, technology and society. We, therefore, need to map the disciplines studying one or more aspects of these patterns and then examine the question of how an interdisciplinarity can be established around these patterns.

3.3 Theoretical Considerations

To insist on working on a theoretical level does not imply a disinterest in applications, on the contrary. Engineering, for example, is an applied field marshalling exceedingly abstract tools (e.g. the use of tensors in the transport phenomena of chemical engineering). How does engineering reconcile these two apparently divergent dimensions? It does so by keeping

an eye trained on the processes with which it is concerned and analyzing them into smaller, repetitive sub-parts which can be studied theoretically so as to be improved or radically modified practically. In our case, a similar task is at hand.

As has been repeatedly pointed out, science, technology and society are constantly scrutinized by various disciplines. The claim is that the relationships between science, technology and society are neglected. Taking this claim at face value, we can identify the field as the study of the relationships between these three elements taken two or three at a time (4 possibilities); these relationships should also be viewed synchronically (states) or diachronically (processes). As a result, the research field is made up of eight possible axes. Each of these axes, in turn, covers many possible areas, but identifying them is not a very difficult task. For example, the synchronic approach to the relationship between science and society can lead to the following open list of fields of research:

<u>The Relationships Between Science and Society</u>
(Analytical or synchronic dimension)

1) From science toward society (Diffusion of scientific knowledge)

   a. Among scientists

      - Disciplinary, institutional, professional patterns of communication

      - Patterns of communication across disciplines, institutions and professions

   b. From scientists to non-scientists

      - Popularization
      - Divulging of science (e.g. J. B. Grasset)
      - Critical science (J. Ravetz)
      - Expertise and counter-expertise
      - Science as source of authority (truth, objectivity, precision, etc.)
      - Science as source of method (logic, experiment, observation, etc.)

2) From society to science (Appropriation of scientific knowledge)

   a. Effective appropriations (research facilities and personnel available)

      - Scientists themselves
      - Governments
      - Industries

   b. Deprivation of access to science (citizens and individuals)

      - Hiring experts
      - Political alliances with scientists
      - Contracting out to scientists
      - Pressure on government

The table is probably very imperfect, but it can lend itself to an intellectual critique aimed at content. Furthermore, it allows for an evaluation of research by sociologists of science, science policy specialists or political scientists. Finally, the seven other axes could be constructed with equal ease. In other words, sketching out the research field constituted by the interactions between science, technology and society is possible and does not lead us into largely uncharted territory. Most of these domains do already exist and are studied in Canada and elsewhere.

While we do not wish to pretend that the above approach to mapping the research field is the only way, we do believe that any map of that kind gives us a way of evaluating where research is already strong and where it is not. This brings us to a problem discussed at great length at the Montreal meeting, namely the lack of macro-level, multidisciplinary theoretical frameworks capable of supporting research work on the complex network of interrelationships between science, technology and society.

We are increasingly conceptualizing reality in terms of structures, Gestalts, interrelated wholes or systems whose properties cannot be derived from their parts. We can study the social and human impact of this or that kind of scientific or technological activity ad infinitum but this cannot

be cumulated into a systematic knowledge of the science-technology-society complex. Case studies must be designed with this in mind. The theoretical and methodological problem is no different from attempting to derive the properties of water from those of hydrogen and oxygen, or attempting to derive the characteristics of a society from those of its members. Any system or organized whole, therefore, requires both macro- and micro-level analyses, and it is out of the dialectical tension between these two levels of analysis that a comprehensive picture can emerge. There has been very little of this dialogue so far in such disciplines as the history of science or technology.

This methodological problem has not been adequately dealt with in the HCST evaluation process, although it lies at the base. There is talk of wholism but no explanation of how this is to be achieved. Past experiences with interdisciplinary programmes have rarely been fruitful because of fragmentation and the lack of a single or several competing frameworks or research paradigms. Such frameworks must not merely summarize the results of micro-level studies but transcend them to point to new and fruitful areas of investigation. As such they help find gaps in the knowledge of an area or reality and are able to support invisible colleges, schools of thought in the proceedings of the St. Mary's 1979 Conference. The lack of macro-level research paradigms and their importance has been stressed by T. Batke (see Appendix B) and J. Abrams, who at the Montreal meeting reported on a recent meeting to review the progress of the many Science-Technology Society (STS) Programmes in the U.S. He pointed also to the difficulty of the relevant disciplines mostly co-existing side by side within these programmes.

The vital necessity of macro-level frameworks to establish a dialectical tension between wholism and reductionism, and between strategic and tactical

studies will bring to light many essential problems that would otherwise remain invisible. The quality of life and the environment, the problems of alienation and reification of human beings, etc., cannot be studied in an exclusively piecemeal fashion. Furthermore, the positive and negative consequences of science and technology often are not only inseparable but also fall into areas of reality studied by disciplines different from those in which they originated. Without macro-level frameworks reflecting the interrelatedness of the science-technology-society complex, the secondary consequences are difficult to anticipate and are discovered only much later. The absence of feedback in this system is one of its primary characteristics. The solution to one problem tends to produce other problems whose solutions cause still different problems, etc. This lack of feedback cannot be reduced without macro-level frameworks showing as many relations in the science-technology-society network as possible. There is a wealth of micro-level impact studies of all kinds but few comprehensive macro-level research paradigms. Their development, therefore, is an urgent task from both a practical and theoretical point of view.

3.4 Access to Knowledge as a Research Priority

The map of the research field immediately brings to light an area of some importance about which little is known. The question of access to science and technology is much less studied than their diffusion. Science and technology constitute the primary knowledge base of our society, yet the access to, participation in and input into decision-making processes related to its use and development have become very restricted for a variety of reasons. A democratic society cannot remain healthy and vital if a growing portion of its people feel unable to participate in shaping

their future. This situation, coupled with the widely varying perspectives that people have on problems related to science and technology, makes it essential that: 1) problems encountered by individuals, groups and institutions wish to research these problems themselves (and if they have adequate research capabilities) they be considered eligible to submit research proposals, and that 2) in the decision-making processes related to strategic funding in the area of science-technology-society interrelationships, the various viewpoints, particularly of those "being impacted upon", be represented.

3.5 Thinking About Institutional Structures

The main thrust of this report is not so much to produce definitive institutional structures incorporating our concerns, as to voice these concerns. However, as skepticism was expressed as to the possibility of translating our viewpoints into workable units, we decided to sketch out the possible outline of a suitable managerial structure. It is proposed here as a way to think about the relationship between problems felt by people or groups and researchers while maintaining a clear focus on the intellectual rigour of the operation.

Essentially, we face a situation where some people ask questions and others claim that they can solve them entirely or partially. In most cases, where granting agencies are involved, those who raise questions are those who can solve them. Here, on the other hand, we would like to open up the possibility of questions being raised by people incapable of answering them; we would also like to see the possibility of answers coming from academics or non-academics. Of course, academics can raise their own questions and solve them but they no longer monopolize these functions.[1]

1. In summary, research proposals could be submitted by 1) academics, 2) non-academics and 3) in response to questions identified by Council

To achieve this opening up of the field, Council must seek out questions and anwers and correlate them in some manner. Therefore, one panel should be set up to listen to various needs expressed by people or groups. It should then examine whether these questions fall within the mandate of Council and within the field itself.

One or several panels should also be set up to deal with the proposal side of the operation in order to gauge the value of these proposals and their relevance in terms of the field and in terms of the questions, sent in by individuals or groups.[1] Finally, a mechanism of some sort should be established to ensure a strong level of communication between the question side of the programme and its proposal side. In this regard, a few well-chosen individuals, rotating periodically, could help translate theoretical formulations into well-directed question and, conversely, specific questions could be fitted into larger theoretical frameworks. These few individuals would obviously play a very important role in the future evolution of the field and would certainly contribute greatly to its eventual cohesion.

This system would offer the following possibilities:

1) Allow the wider community to voice its concerns in the form of questions to be solved.

2) Allow the researchers, be they academics or not, either to respond to these practical questions, or profer their own research projects, be they applied or theoretical.

3) Allow for a constant dialogue between theoretical and practical questions, thus leading to the intellectual structuring of a very

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1. There could be several such panels, up to four, perhaps (if the synchronic and diachronic dimensions of each axis are treated together). Membership should include non-academic as well as academic researchers. Proposals should be evaluated blind (i.e. without any regard to name of author or institute of origin.)

wide field, and the eventual training of a small number of individuals in the difficult art of translating the practical into the theoretical and vice versa, all within a domain far wider than any single discipline. These individuals, presumably, would have a degree of experience in the field such that they would play an important role in its evolution.

4. RECOMMENDATIONS

Our findings lead to the following recommendations:

1. That science-technology-society interactions be considered as a field of potential intellectual value and be funded by a strategic grants programme of SSHRC.

2. That SSHRC set up the following boards:

   a) A board to assess research proposals. The board would contain 4 or 8 review panels, each representing a variety of disciplines associated with the 8 axes of the field taken either singly or in pairs. Panel members should not all be drawn from the academic community and should have an interdisciplinary interest in related problems.

   b) A review board to select and filter problems submitted by individuals, groups and institutions of all sorts.

   c) A small research unit to seek out these problems in the community, to translate theoretical problems and findings into practical implications and to translate practical problems into theoretical terms. Members of this unit should be broadly representative of society and have limited terms of office during which they are supported by fellowships. Such a unit could make periodic recommendations to the institutional structure of the field as it evolves intellectually.

3. That all research proposals must explain how the science and technology related problem they propose to study relates to the broader pattern of science-technology-society interactions and how this affects the scope of the research and its methodology. This will aid their classification for the purpose of evaluation and review.

4. That research proposals compete in three categories as outlined in this report.

UNIVERSITÉ DE MONTRÉAL

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SOCIOPOLITIQUE DES SCIENCES

Le 29 septembre 1980

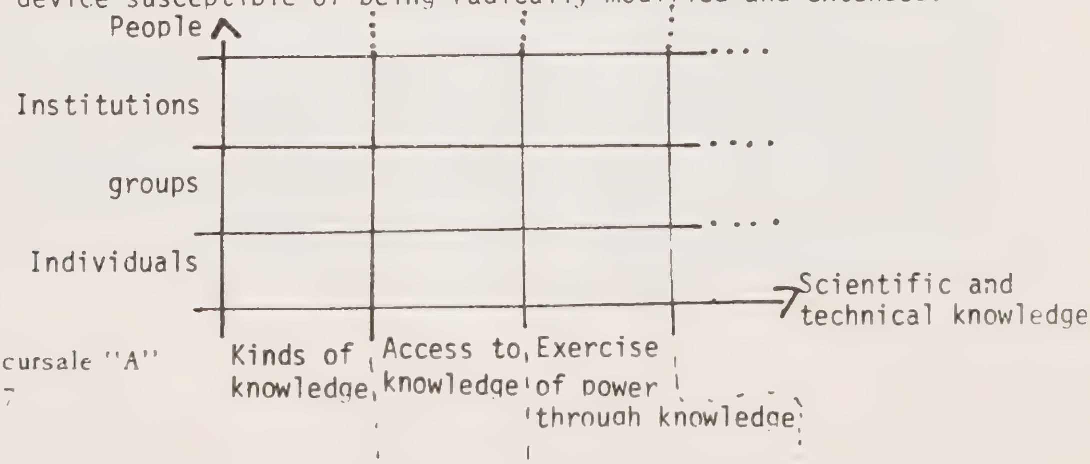
Science and technology have constituted and continue to constitute a vital knowledge base for our society. However, the access to, participation in, and input into decision-making processes related to its use and development have become severely restricted for a variety of reasons. A democratic society cannot remain healthy and vital if a growing portion of its people feel unable to participate in shaping the future. It is, therefore, most appropriate that in view of the fact that science and technology have permeated almost all aspects of our society, science and technology become an area of national concern.

With respect to this situation and in terms of their relationship to the central knowledge base of our society, Science, technology and society studies (S.T.S.) can be conceived according to two sets or criteria:

a) whether an STS study primarily deals with relationships between individuals, groups or institutions and that knowledge base.

b) whether it primarily deals with the development, maintenance and transmission or application and use of this knowledge base.

All this could be summarized in a table which should be viewed not as the exhaustive representation of STS studies, but as a kind of open analytical device susceptible of being radically modified and extended.



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It can also be noted that STS studies differ greatly from philosophy of science. Philosophy of science has dealt either with the validity of scientific discourses or the capacity of human beings to know something about the outside world. However, it has left aside the question of how individuals, groups or institutions relate to scientific and/or technical discourses. For the philosopher, (and this is also true in some measure of history and even sociology of science) one either knows science or ignores it. By contrast, STS studies explore how certain kinds of activities labelled scientific and technical can be appropriated by certain individuals, groups or institutions and how this affects both the content and meaning of these activities, as well as the social fabric.

The formulations of what might constitute the theoretical locus of STS are probably imperfect and incomplete, but in proposing them, we want to make sure that we all thing about some possible definitions of this still nebulous field.

The approach sketched above has an advantage built in it: it incorporates the notion of a problematic relation between individuals, groups and institutions with knowledge. But as this approach also aims at promoting a peculiar kind of knowledge - namely STS studies - the same problematic relationship should reappear between STS studies (as discourse) and its potential practitioners, if only to avoid falling into the quandary which STS studies aim at unravelling in the case of science and technology.

One final comment before proceeding: past experiences with multidisciplinary programs have rarely been successful because of fragmentation or lack of a sound theoretical framework. Such a framework must not merely summarize the results of detailed studies, but transcend them to point to new and fruitful areas of investigation. At present, there exists no such framework, and we should give some thought to this fact if STS studies are to become a healthy area of research. STS should not become a cloak in which almost any research project can be dressed to make it eligible, for then this area will, like so many other multidisciplinary programs, collapse very rapidly. This is not to say that parallel schools of thought, each founded on competing frameworks, cannot exist, but we have not even reached this stage as yet.

Moving beyond purely theoretical questions, it is important to note that our discussions will take place within a very specific focus - namely that of a strategic grant. The military terminology used in this regard clearly points to the fact that SSHRC is thinking in national terms and wants to bolster studies which have national significance or use. But all this takes place when the idea of a Canadian nation is the object of deep debates triggered in part by the political evolution of Quebec and the economic evolution of other provinces (e.g. Alberta and Newfoundland). At any rate, it means that we are dealing not only with a theoretical question, but also with an applied one - namely, what can STS studies contribute to on-going debates in Canada.

There is a final constraint acting on us when we gather in Montréal. Not only do we have to define a field in theoretical terms and examine its potential applications to the Canadian scene(s), but we must also translate our findings into a number of clear recommendations which will be compatible with SSHRC's mandate and with its information-processing methods, so as to generate viable policies. We may or may not be listened to, but in any case, we should make sure that we are well understood. One way to achieve this result would be to provide SSHRC with answers to questions like the following:

1.Who is eligible for access to SSHRC's funds within the strategic grant area which concerns us (STS)?

2.How can it be decided that a proposal from an eligible researcher falls within STS?

3.How can proposals be ranked?

In same ways these are mere administrative questions, but SSHRC has a mandate to administer funds, and how it does so will affect not only the form but the content of research. In other words, we must keep one eye trained on large, substantive and theoretical questions while focusing at the same time on the other highly practical questions of policy definition. This instance of intellectual strabismus, to speak, is essential if we do not want to remain ineffective at intellectual levels, and yet not compromise intellectual regour with institutional pragmatism. By leaning on, or reacting to, the various regional reports which should be in your hands now, as well as the earlier national report penned by Professor Hooker, we should be able to proceed fairly smoothly from the theoretical to the practical without losing sight of either at any time.

When thinking about criteria of eligibility for non-academic groups, we should remember that present SSHRC policy prevents main investigators from being paid a salary. Also, federal money is not likely to flow very long, if at all, in areas under provincial or local jurisdiction; neither will it flow very long if it repeats current programmes. But we can also keep in mind that most research done about science and/or technology is done from the point of view of those who do the impacting (or believe they do), rather than from the point of view of those being impacted upon.

We must also keep in mind that SSHRC, by definition, only deals with Social Sciences and Humanities. In other words, a de facto division of labor between scientists, engineers, social scientists and humanists is implied by the structure of existing granting agencies. This may or may not be favorable for the blossoming of a field such as STS.

It must also be recognized that SSHRC's main target are academics and academic level studies. The question of definition of such terms will

deeply affect accessibility to SSHRC's funds.

At this stage, and very concretely, we would very much appreciate if you could come to the meeting with some statements jotted down (two page total, perhaps) in reaction to the three questions above. What we would like is to see you react to these questions both in terms of the theoretical implications they bear for STS studies as well as the more mundane, almost managerial dimensions they incorporate. For example, the choice of questions appropriate for STS studies necessarily refers back to some overall view of STS studies, but it also incorporates operational criteria allowing a jury to draw a line in a systematic (if not always rational!) manner. We must not allow ourselves to be trapped by the demands of the system-lover, but we cannot disdainfully act as if they do not exist either.

Finally and as a temporary conclusion, we have attempted to write this little paper in such a way as to put as few constraints on you as possible. We may or may not have succeeded, but if we have not succeeded, it only means that we cannot put our intentions across effectively, not that we have evil intentions. All this is meant to trigger discussions in Montreal and nothing more.

Many thanks,

Bill Vanderburg
Jean-Claude Guédon

/gd

UNIVERSITÉ DE MONTRÉAL

INSTITUT D'HISTOIRE ET DE
SOCIOPOLITIQUE DES SCIENCES

Le 30 septembre 1980

The Montreal meeting has emerged as an extra-step in the decision-making process started by SSHRC in the area of strategic grants and specifically for The Human Context of Science and Technology. After a national meeting held near London, Ontario last November, a number of regional meeting were held in the West, in Ontario and in the Maritimes.

For some of the participants at the first meeting, the logic behind the organization of the decision-making process remained obscure, and they felt that "substantive positions" were more important (and interesting) than regional positions. As a result, a different kind of meeting was negociated with SSHRC representatives, Alan Fox and Maureen Woodgrove last summer and the Montreal meeting is the result of these negociations. This meeting cannot (and should not) be equated with a regional workshop and, in particular, it does not attempt to represent Quebec in any manner. The origin of participants (from Vancouver to Halifax) and the very small number of people from Quebec should preclude such an erroneous interpretation of our meeting in Montreal. On the other hand, we have not heard from any Quebec regional meeting and must therefore assume that none took place. How this affects the validity of the other regional exercises is a question we do not intend to address.

Bill Vanderburg (University of Toronto) and Jean-Claude Guédon (University of Montreal) have assumed the co-chairmanship of this meeting and have jointly organized its various facets. In order to give some focus to the October encounter, we have drafted a small paper which you will find enclosed with this letter and which should be regarded not as a constraint of any kind, but rather as a catalyst for your thoughts. The motivation behind this paper is the following: our meeting is short;

se postale 6128, Succursale "A"
ntréal, P.Q., H3C 3J7

we have a lot of ground to cover and some specific recommendations should emerge from our encounter. Such a paper, it is hoped, will warm us up, so to speak, before we congregate in Montreal.

We look forward to meeting you in Montreal.

Jean-Claude Guédon

Bill Vanderburg

Jean-Claude Guédon

/gd

P.S. Last minute problems and changes can be handled by calling Jean-Claude Guédon at the following numbers:

Office: 343-7018
Message: 343-7620 or 343-7351
Home: 277-7622

ATLANTIC REGION REPORT

BACKGROUND PAPERS

A POSITION PAPER ON PROFESSOR HOOKER'S REPORT,
THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

Don Clairmont, Professor, Sociology, Dalhousie University

Professor Hooker has written an interesting report on the symposium held recently in Ontario to discuss issues and research priorities in the Human Context of Science and Technology (HCST). This latter area has been selected by the Social Sciences and Humanities Research Council as one of its four foci for strategic funding.

The importance of the HCST field is related by Professor Hooker to two very general concerns; first, problems related to the social deployment of Science and Technology; secondly, the 'placing' of Science and Technology as a societal commitment. The case for HCST is reasonably well made, abetted by such heavy words as watershed, threshold, extinction, pressing against limits, as well as important though less strategic concepts such as scale and feedback. A little more on the praxis dimension would have been desirable, particularly in a section dealing with the relevance of HCST. In Annex 2 of the report meaningful questions are asked and useful criteria advanced for selecting research priorities but again little is raised concerning the perhaps special role of university-based research, the role of scientists/technicans as opposed to technocrats, power, and the capacity and prospects of laymen participation in Science and Technology policy and practice. There is some mention of such considerations in Annex 3 but perhaps because these represent my chief interest in HCST, I find the attention inadequate.

Professor Hooker's discussion of the HCST field clearly establishes its great scope and depth. The depiction of three levels of HCST in Annex I was less meaningful for me—since there is no clear entailment of the lower by the higher levels of generality—than the framework describing six levels of challenges which Professor Hooker uses to convey the richness of the field. As contended, the HCST field does fit the criminology model, being interdisciplinary and characterized by tensions associated with its empirical/normative and policy/theory thrusts. I am confident,however, that most social scientists would say that criminology is much more clearly delineated and especially more delimited. Perhaps this latter difference will vanish as (and if) HCST becomes more institution-alzed; as conceived by Professor Hooker HCST is both older and younger than criminology at the present time.

In laying out the HCST field Professor Hooker relates the variety of suggestions for research projects advanced by participants at the Ontario conference. I found the suggestions interesting though obviously highly selective; an especial interest of mine—the impact of Science and Technology on the number and quality of jobs—received no explicit mention though a strong case could be made for its priority. In this general context of potential research emphases, the question of a demand for HCST is raised by Professor Hooker and coupled with a suggestion for research into alternative research institutions and alliances; I want to come back to this consideration below.

The final section of the Report focuses upon three institutional issues. The development of HCST is urged and especially the need to overcome the constraints of discipline specialization. As a researcher who has spent the past five years in an inter-disciplinary research group I can attest both to the difficulty and to the rewards (practical as well as intellectual) of overcoming such constraints. Secondly, the dangers of top-down directed research are alluded to and some suggestions advanced to deal with these dangers in an institutional fashion. The suggestions here are from the perspective of professionals in the HCST field and might well be seen by outsiders and laymen as rather self-serving. However the third issue raised somewhat compensates for this 'short-fall' in that it deals with processes of support for HCST and in this connection refers to the provision of equitable access for all groups, and a role especially for research-deprived social groups; a proposal is advanced for involving the latter in decision-making bodies for example with SSHRC although in an accompanying footnote skepticism is expressed concerning "the effectiveness of such broader representation to address issues of inequity in this context."

It is very significant that in the two key sections of the report (dealing with the HCST field and institutional issues) Professor Hooker couples demand for and support of HCST with ideas about alternative research institutions and

alliances and equitable access for all groups, especially those most research-deprived. Clearly an association is being suggested but the whys and wherefores are not spelled out. This lacuna is not surprising given that in the initial section dealing with the importance of the HCST field, as I noted above, there was little attention to praxis and related issues of the special place of university-based research, the capacity and prospects of laymen participation and so forth. I believe that consideration of such issues would not only provide important research topics but also could account for and support the association to which Professor Hooker is alluding.

Sociologists studying social problems have come to adopt,in recent years,a theoretical model in which social problems are defined subjectively and seen as social movements oriented to favourable governmental action. This approach strongly underlines the role of government in the authoritative allocation of value and explicitly acknowledges that as the g.n.p. measures economic growth, societal power growth may be reflected in the increasing assumption of responsibility by government for the social welfare of society's members. Fulfilling this responsibility may well require the large-scale bureaucracy and significant scale intra-mural research which has in recent years threatened the 'free research' of university-based researchers; in certain areas nowadays these scholars must tailor their research proposals to priorities established by specific governmental departments or even bid on research delineated by the latter

whereas formerly, when government did not have such a research capacity or enlarged mandate, the scholars appeared to have more freedom to define the research priorities. It may well be that the dangers of centralization and technocracy implicit in this process (a process that can be readily justified as a response to ever-increasing demands by an increasingly wider range of interests) are causing university-based researchers to explore new research institutions and alliances as a counterweight to this trend; certainly it is not surprising,therefore, in considering demand and support for the HCST field, where researchers could be expected to be especially aware of these necessities and dangers, that questions of constituency and social responsibility would be associated with autonomy and integrity in the research process.

At any given point in time virtually any field such as Criminology takes on a character or position which activates and channels its theories, concepts, priorities, etc... and which expresses its 'domain of sentiments' to use Alvin Gouldner's phrase. What is HCST's to be? I have been suggesting that Professor Hooker appears to be alluding to such a domain of sentiments (which would give HCST its thrust) by associating demand for and support of HCST with new research institutions and alliances, and the research-deprived. Because of the dangers of centralization and technology, because it is the human context that is emphasized in his report and because there

is no such thing as a free lunch (HCST like other fields and interest groups has to justify its claims for both public funding and relative independence from powerful decision-makers) I think that this allusion should be explicitly considered in all its aspects. These latter might include, among other things:

> consideration of the hallmarks of the HCST field being openness, integration and participation with respect to what Professor Hooker calls the "impacted people"
>
> concern with the demystification and simplification of Science and Technology (do we need more Benthams decrying "the fallacy of complexity" or, if complexity, centralization and large scale are necessary, how can we render them more human)
>
> consideration of empirical and normative patterns associated with styles of research with the view of going beyond the practical and ethical limitations of informed voluntary consent.

One might suggest many researchable issues and assess research strategies from this position. Presumably other specific HCST projects would be informed by such a thrust. One implication from our experience in the early seventies is than an open and participative as well as ethical relationship with the research-deprived, the periphery groups and the public at large is best realized when these latter have resources to sustain balanced relationships.

WHO NEEDS HCST STRATEGIC FUNDING ANYWAY? A RESPONSE TO THE HOOKER REPORT

Roger Cooter

Killiam Fellow, Department of History

Dalhousie University

19 May 1980

These remarks follow upon the Atlantic Provinces' Workshop to discuss the Hooker Report on strategic funding in the field of the 'Human Context for Science and Technology'. Though some of the comments and opinions expressed here are shared by others who attended the Workshop, this response to both the Report and the Workshop is informed solely by my own vested personal and academic interests in the social and intellectual study of science and culture. It should also be clear at the outset that the act of participating in the Workshop and responding to the Hooker Report is not to be taken as lending tacit approval to the principle of strategic funding in the HCST field. The wisdom of strategic funding in any field seems to me to be highly debatable.

The title of my response is not entirely facetious. The question was put at the Workshop: 'Has anyone experienced difficulty or known anyone else to have experienced difficulty in receiving funding for a research project in the HCST field, whether disciplinary or interdisciplinary?' This was greeted with what might be called a reluctant silence which eventually was punctuated by a biologist who spoke of his failure to receive funding for a project involving the monitoring of his ecologically designed home because, he claimed, his project did not fall squarely within either the funding categories of the SSHRC or the science research council. Another speaker referred to the rejection of SSHRC funding for his interdisciplinary project in the HCST field although, by his own admission, this may have been because the project was not as well thought out as it ought to have been. No other instances of difficulty could be cited.

But the apparent lack of existing difficulty for academics obtaining research funding for justified projects in the HCST field is not the reason why I wish to voice some dissent from the general consensus that individualist research funding in the field is a 'good thing'. My dissent stems from an impression that few people actually have any clear notion of what they are talking about when they refer to 'the problems' associated with modern science and technology. As in the Hooker Report, so in the Workshop, 'science' and 'technology' were routinely referred to as if they were, in and of themselves, unproblematic and could be addressed and 'assessed' in terms of their 'use', 'abuse' and 'impact'. That modern science and technology might not be 'things' but be socio-historically determined, ideologically-constituted concepts, or that the whole framework of use/abuse thinking might itself be a part of a socially-constructed mataphysic

(positivism), was a viewpoint that was noticeably absent. From the discussion at the Workshop one would never have guessed that there exists an extensive body of deeply reflective literature on the socio-political nature, meaning and origins of modern science and technology. Not only was reference never made to the sociology of scientific knowledge and practice (except, absurdly, as in the Hooker Report, as a peculiarly esoteric sub- sub-discipline of academia), but also, there was never any mention of the names (let alone the thoughts) of such well-known thinkers on science and technology as Marcuse, Habermas, Ellul or Roszak - that is, no reference was being made to the ideas of the very people who have been largely responsible for raising public consciousness to the importance of thinking seriously about and conducting research into science and technology. After more than a decade of rigorous critical scholarship into the HCST field, its not just embarrassing, its extremely worrying to hear (even philosophers) referring to scientific Truth as if it were some absolute, objective, non-relative entity and touchstone. Though at the Workshop 'technocracy' was mentioned and there was recognition that everything on our agenda was 'political' in some sense or another, and that connections existed between science/technology/medicine and capitalism, neither the political nature of the spectre of technocracy nor the less-than-obvious political nature of the connection between science/technology/ medicine and capitalism were gone into. Discussion on these heads was avoided and the far-simpler manifestly ethical ('quality of life') considerations were given priority.

That no one at the Workshop was either willing or able to tackle the metaphysical (i.e., the socio-political-economic) heart of the matter is hardly surprising. In Canada (by contrast with Britain, America and elsewhere) no centres have been established for the reflective (or other) comtemplation of science and technology, and few university courses have been designed to encourage understanding of our scientist reality. Anyone wishing to do graduate work or otherwise skill him or herself in the HCST field must be advised to emigrate if s/he wishes in the pursuit of understanding to enjoy any of the comforts and benefits of intellectual community. The latter problem of isolation in all areas of HCST research in Canada and of not having access to information about what is going on in the field in the rest of the country, and of knowing, least of all, what might be going on in the decision making councils of the SSHRC, was one frequently referred to by all the participants in the Workshop, and it leads to the answering of the question in my title.

Although several participants at the Workshop felt (as other commentators on the Hooker Report have[1]) that greater emphasis should be placed on the value of funding reflective research into science and technology and that it would be unwise to supply the SSHRC with a list of research priorities lest such a list lead to the demoting in importance of reflective studies and the promoting of action-oriented quantificatory research, it was not suggested that the latter king of research should always be tempered by contact with the former. I would go so far. Believing that action without

theory is truculent and blind just as theory without action is arrogant and empty, I would contend that what is needed in Canada are HCST regional centers devoted to the pursuit of critical (theoretical-historical) understanding of science and technology <u>blended with and made inseparable from</u> action-oriented evaluative research.

Many of the other problems foreseen in connection with HCST funding and the conducting of HCST research in Canada might also be overcome through the provision of HCST regional centers. First, by channelling available funds through such centers those who <u>do</u> seem to be in need of research grants at the present time, namely, pre- and post- doctoral students, could more readily be brought within the scope of the proposed HCST strategic funding. Second, the regional centers could solve the problem of informational anomie by making available to anyone interested the extent, location and nature of past, present and proposed HCST research. Third, such centers could assist in the regional planning as well as in open and informal adjudication of research projects (both regional action-oriented and reflective research), thus overcoming present irritation with the remoteness of the closed-door and non-appealable decision making on research proposals submitted to the SSHRC in Ottawa. Fourth, through affiliation with regional centers researchers would have a forum wherein to express problems they may encounter in their research and a forum wherein they can readily solicit informed advice and guidance. Relatedly and finally, the problem of researcher's knowledge that at every stage of his planning and action a community of concerned and informed persons was available for discussion, consultation and human understanding.

In short, what the proposal for HCST regional centers amounts to is <u>provision for a more human context for both the funding and research</u> into the Human Context for Science and Technology - the elimination of the potential for inherent contradiction within an HCST programme. I would predict that since no individual can be expected to fully understand the dimensions and complexities of the human and social problems raised by modern science and technology, a more co-ordinated collective approach to the problems and the research into them will be more intellectually productive, economically efficient and socially fruitful. Happily, there is nothing within the Hooker Report that precludes the serious consideration of this suggestion. Indeed, by utilizing the Institute for Human Values at St. Mary's University and the Institute for Humanities at the University of Calgary for discussion of the Hooker Report, the SSHRC has already established a valuable precedent for the use of such institutions in the deployment of a mature, research-co-ordinated and contradiction-less HCST programme.

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1. See for example the comments of Egmont Lee on behalf of the Calgary Institute for the Humanities in C.A. Hooker & T. Schrecker, eds. <u>The Human Context for Science and Technology</u> (SSHRC Working Document, 1980), p. 118.

<u>Suggested Readings for Transcending the Merely Ethical Consideration of Science, Technology and Medicine</u>

Barry Barnes, ed. <u>Sociology of Science: selected readings</u> (Penguin pb, 1972).

____________, <u>Scientific Knowledge and Sociological Theory</u> (London: Routledge: 1974).

Roger Cooter, 'The Power of the Body: the early nineteenth century' in Barry Barnes and Steven Shapin, eds. <u>Natural Order: historical studies of scientific culture</u> (London/Beverly Hills: Sage: 1979), 73-92.

____________, 'Deploying "Pseudoscience": then and now', in M. Osler, M. Hanen and R.G. Weyant, eds. <u>Science, Pseudoscience and Society</u> (Calgary Institute for the Humanities Publication: Wilfred Laurier Press: Waterloo, Ontario: forthcoming, 1980).

Norman Diamond, 'The Politics of Scientific Conceptualization', <u>Science for the People</u>, 7 (May 1976), 14-17 & 40.

David Dickson, <u>Alternative Technology and the Politics of Technical Change</u> (Fontana pb, 1974).

Jacques Ellul, <u>The Technological Society</u> (N.Y.: Vintage: 1964).

Karl Figlio, 'Sinister Medicine? A critique of left approaches to medicine', <u>Radical Science Journal</u>, No. 9 (1979), 14-68 (with an extensive critical bibliography, pp. 148-160).

Jurgen Habermas, 'Technology and Science as "Ideology"', in his <u>Towards a Rational Society</u> (London: Heinemann pb, 1971).

David Ingleby, 'Ideology and the Human Sciences: some comments on the role of reification in psychology and psychiatry', in Trevor Pateman, ed. <u>Counter Course</u> (Penguin pb, 1972), 51-81.

Jorge Larrain, <u>The Concept of Ideology</u> (London: Hutchinson: 1979).

William Leiss, <u>The Domination of Nature</u> (N.Y.: Braziller: 1972).

Herbert Marcuse, <u>One Dimensional Man</u> (London: Routledge: 1964; also Sphere and Abacus pb).

Michael Mulkay, <u>Science and the Sociology of Knowledge</u> (London: Allen & Unwin: 1979).

David Noble, America by Design: science, technology, and the rise of coporate capitalism (N.Y.: Knoph: 1977).

Theodore Roszak, The Making of a Counter Culture: reflections on the technocratic society and its youthful opposition (London: Faber: 1970).

_______________, Where the Wasteland Ends: politics and transcendence in post-industrial society (N.Y.: Doubleday: 1972).

Alfred Sohn-Rethel, 'Science as Alienated Consciousness', Radical Science Journal, 2/3 (1975), 65-101.

_______________, Intellectual and Manual Labour: a critique of episemology (London: CSE books: 1978).

Roy Wallis, ed. On the Margins of Science: the social construction of rejected knowledge, sociological review monograph 27 (Keele, 1979).

R.M. Young, 'Science is Social Relations', Radical Science Journal, 5 (1977), 65-129 (with an extensive critical bibliography).

Science for People (the quarterly magazine of the British Society for Social Responsibility in Science) Special issue on 'Science Under Capitalism', No. 43/44 (Autumn, 1979).

POSITION PAPER ON THE DEVELOPMENT OF THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY FIELD

Harley d'Entremont
Professeur adjoint
Département de science politique
Vice-doyen, Faculté des sciences sociales
Université de Moncton

Preface

When I was asked to attend the workshop and prepare a "position paper", I neglected to ask for "advice" as to have the paper should be structured. As a result, it may not be what was expected of me. However, what I chose to do was a very brief exposé of two aspects of the HCST field that interested me. The text, therefore, is not a coherent whole (for that matter, the parts may not be coherent) and has not overriding conclusion except to suggest that we should pay close attention to the social and cultural impact of science and technology on mino minority groups in society.

Cultural Impact of Science and Technology

One of the key elements in the development of the Human Context for Science and Technology field (HCST) should be, in my opinion, the study of the social and cultural impact of science and technology. This is especially important in the case of cultural ethnic minorities such as the Acadiens. While of special importance in the case of minorities, it is also important for the rest of society.

Hooker in his Report makes reference to the social and cultural impact on native people of the oil development in the Beaufort Sea. Traditional life-styles in the North are being drastically affected by a technology that is very foreign to them. In more of less the same vein of thought, one could talk about the cultural impact on Acadiens of being forced to migrate to predominantly anglophone industrial centres in order to find employment. Here we see the "collusion" of two types of technologies having adverse effects on a minority group in society. Scientific advances in industry have encouraged policies of centralization (social technology) which have disrupted many settlement patterns throughout the country. Rapid industrialization has also strongly influenced (or affected) community lifestyles and values in places such as Port Hawkesbury (for example, see Raymond Foote, The Case of Port Hawkesbury, Toronto, PMA Books, 1979). The study of the cultural and social effects of industrialization should thus be a key element in any development of the HCST field.

Another facet of science and technology that has far-reaching effects on various groups in society (again, especially minorities) is that of communications. For example, not too long ago the newspapers were reporting that people were moving to the suburb of a particular town to escape from urban problems such as congestion, etc. The town in question had barely two thousand inhabitants! No doubt these were people who, after seeing and hearing about urban problems in "cities" on television, came to think that they too had to "flee" from the prlblem-plagued inner city.

The last point that I wish to touch on concerning the socio-cultural impact of science and technology is that of social (cultural) indicators. While admitting that there are serious difficulties and problems involved in the development of adequate social and cultural indicators, we should nevertheless strive to improve

what we have. To analyze changes in social and cultural conditions without some type of "indicators" seems to be impossible. In addition, we should encourage some fairly broad descriptive studies of present social and cultural conditions, especially among minority groups. This would enable us to better analyze the impact that science and technology has on cultural/ethnic minorities. Without adequte measures of actual social and cultural conditions, I fail to see how we can adequately assess changes in those conditions. In effect, what I am arguing for is some sort of socio-cultural inventory. This would include studies of attitudes and "values", however defined.

Public Policy Theory

Hooker suggested in his Report that more work be done on the theory of public policy relating specifically to the role of technology in society. Does this include technology from the "soft" as well as the "hard" sciences? From the types of papers presented at the Western conference, and from Hooker's Report, I assume that it does. If that is the case, then I wholeheartedly agree with his suggestion.

As a follow-up to Hooker's suggestion, I would argue that we should pay greater attention to "values" as an important element in the policy process. In this context, we use Young's definition of values as "the policy-makers' subjective understanding of the environment in which they operate... the assumptive world" (Ken Young, "Values in the Policy Process, Policy and Politics, Vol. 5 (1977) No. 3). Given the increasingly important role of science and technology, a better understanding of how policy-makers perceive or understand their environment seems to be crucial in any attempt to understand their actions and decisions concerning science and technology.

Also, "science and technology" can be thought of as being part of the environment of the political system (or of policy systems). In this light, Young's concept of "assumptive world" leads us to investigate or study the subjective understanding that policy-makers have of one part of their environment (science and technology) and how they relate this to their understanding of other environmental factors. For example, we could investigate how policy-makers perceive the scientific aspects of energy development and how they relate this to their understanding of the social political, and economic issues involved.

FACULTÉ DES SCIENCES SOCIALES

UNIVERSITÉ DE MONCTON

CENTRE UNIVERSITAIRE DE MONCTON
MONCTON NOUVEAU-BRUNSWICK CANADA E1A 3E9

THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

Three concerns

I conceptualize this gathering as having a minimum of three purposes:

1 - React to and analyze the documents already prepared on the Human Context for Science and Technology (HCST);

2 - Bring forth additionnal ideas and make them more specific;

3 - Provide for a broader "grass root" input in the elaboration of themes and policies on HCST.

In order to fulfill my commitment to those goals I have concentrated my thoughts on three specific areas of concern. But before I express them, allow me to project my admiration for Dr. C.A. Hooker's preliminary report. It is a very comprehensive review of the subject matter and I have no intentions whatsoever to criticize a report which I consider to be a masterpiece. I will rather use three of the concepts defined by the author which I personnally wish to see emphasized and developped.

The first one deals with the research-action interaction, the second with the research-environment interaction and a third one focuses on the pervasive and conditioned response in all of us which molds our thoughts in such a way as to hold a narrow association between research and technology. I will try to illustrate that from each one of these issues, we can first draw practical suggestions on policy and, second, ask research questions not frequently asked and less frequently supported by granting structures.

Research-action interaction:

In recalling the historical circumstances which surround our present awareness of the human context of science, Dr. Hooker states that science has been responsible for making it possible for humans to create the social and human problems which have now become central to our scientific preoccupations. The argument, if taken a step further, could be used to criticize the way in which research endeavors have been dispersed in a haphazard fashion, so much so that much of it has either been reported too late, was irrelevant to start with or succeeded in destroying the dialogue between the scientific community and society.

I suggest for your consideration that many small research projects provide an empirical support for analyses of problems which have already been analyzed without the use of a specific technology. When research results are provided, they often come too late to have an impact or are too limited in scope to be worth serious attention or again are so wrapped up in a concern for good technology that they are ill-equipped for a sound dialogue between researcher and decision-maker.

One way to deal with this problem could be to specifically encourage action-research as part of our global research strategy. Let me illustrate by saying that many communities in the maritimes are interested in better communication services (TV., radio, etc.). They are already advocating strongly for local stations, extensions of networks, etc. However, while they are exhausting themselves trying to catch up with a nearly outdated technology, the concepts and supporting social structures of the world of communications is changing at a pace which allow us to predict the inevitable. Policies will be carried out and demands will be answered on the basis of mere political opportunism and large groups of canadians will end up with outdated technology believing by the same token that they have made tremendous progress. The human tragedy of it all is that a lot of research is being done and will be in the coming years with total ignorance of this reality. People will be evaluated, economical impact studies and surveys will nourish the need for more research while deepening the disparity between regions and groups.

My suggestion is that action-research will better serve the human context under such circumstances. Allowing for the dissemination of information while you survey a population and putting money in experimental groups or communities while you try to define the economic impact are ways of providing both action and research. Simple research technology applied to such issues will not even come close to a consideration for the human context.

With the prevalent incentive structure for supporting research at the moment, neat statistical packages will be compiled, attitudes will be defined etc, but the human context will not have been part of the strategy. New incentives are needed to encourage research in settings where interactive models place the researcher and society in an interface situation.

Research-environment interaction

Consideration for human context in research ultimately leads to a concern for specific environments. Science in general and through many of its disciplines has great concern and teoretically recognizes the particular instances and circumtances which define human context. Stated differently, this idea points to the richness provided by the diversity of environments and as such cannot be discounted in research. That is to say much of the details of our social realm, worthy of being studied, must also be studied in their different environments. And such considerations have special meaning for our canadian context. The heterogeneity of environmentsof our Canadian context calls for a great deal of differentiation in choosing appropriate settings and poses a problem of validity for our paradigms. If validity increases as the number of observations increases, it should also stand that in a wide variety of environments and a complex pattern of groups and regional differences as in Canada, research policy should take into account those disparities by regionalizing part of its research on human context.

Research and technology

Present research funding and research activities follow a process whereby proposals, review, the actual projects and dissemination emphasize the role of technology in research. I do not think that the reason for the larger amount of research in physical sciences is totally unrelated to that process. Their natural "matter" lends itself to a materialistic conception of research whereby methods are embedded in technology and where results are translated or directly perceived in quantities. In human contexts, such embeddedness of methods in specific technologies is questionable and statistical representations of results often lead to the uncomforting conclusion that the technology was not adequate to provide for unequivocal interpretations of the data. Consequently, the race drags on for more refined technology.

I was very much impressed, indeed, by Dr. Hooker's review of the problem and wish to affirm his position that we need not put so much emphasis on the research-technology equation but we desperatly need to equate research and thinking. If our thinking

around the broad question of human context has been inadequate, I believe it is because of social science's tendency to view natural sciences as something to improve upon rather than to think about. More exchanges between researchers on such questions as values in science and education would be in my view a giant step in the right direction.

By way of a conclusion let me state briefly that I have called for new policies and a redistribution of funds to support more action-research, that I have suggested that research strategies and themes should flow from a policy based on regional and group disparities and that funding should become an incentive for exchanges between interested researchers, for training, and for theoretical work on the human context of science and technology.

If I have repeated what is already in the preliminary report I have at least tried to keep it brief and specific. My main concern being that outlying regions of the country and smaller research institutions again run the risk of seeing themselves more estranged from the mainstream of events, I have tried to bring your attention on a sample of three issues which could certainly be analyzed for their potential in serving the interests of the entire community.

Léandre Desjardins, Ph.D.
Doyen.

LD/ll

Moncton, New Brunswick,
May 4, 1980.

The role of ecology in providing guidelines for future developments in Science & Technology

by

John W. Evans
Dept. of Biology
Memorial University of Newfoundland

How did we get into this mess? A brief historical perspective.

In the beginning men were innocent great apes with limited means of doing mischief. Man, the animal, lived under and adapted himself to the laws of nature. As an animal, he enjoyed few advantages over the other plants and animals which shared his ecosystem.

With the evolution of his brain man found that he could modify the previously uncontrolable forces of nature. The first technologies; tool making, fire and early agriculture gave man the ability to "tilt the game" in his favour. He has been doing mischief with his environment ever since. Man's negative effect on the environment is not new but it has accelerated greatly with the recent growth of science and technology.

In the past 50 years science and technology has given man the power to dominate nature. Why is it then that the environment seems to be so disruptive and out of control? Why is our science and technology associated with species extinction, resource depletion, industrial poisoning, acid rains, population explosions, etc., etc.? Perhaps it is because the 'fixers of the world', politicians, economists, business leaders, engineers -

those with the power to direct the application of technology - understand the ability of technology to solve immediate problems, but because they don't understand the basic rules, they lack the wisdom to foresee the long term effect of their tampering.

Science and technology have essentially become problem solving tools. These days many of the problems arise as a direct result of earlier technological solutions. Problems are examined in isolation and a specific solution for that problem is developed, the "Technological Fix". Almost without fail the technological fix leads to an unexpected "Environmental Backlash" which causes new and often more severe problems which need new technological fixes.

Ecosystems are complexly interconnected biotic and abiotic systems. Man, try as he might, cannot isolate himself from his ecosystem. Every technological action which man uses to modify his environment, either to his advantage or his neighbours disadvantage will surely result in some equal and opposite environmental reaction. The problem is that because man's ecosystem is now in effect the whole earth, it is so complex that we cannot predict the reaction to our interferance.

Most science and technological research which is being funded by governments today are of the "more is better" variety, requiring more specialization and narrowing of fields. This shotgun approach generates more and more information but less and less understanding of the functioning of the whole. This lack of wholistic thinking seems to cause us to fight against natural processes instead of working with them.

Where do we look for direction, for understanding of the basic rules of nature? I would suggest that we look to the foundation biological science, Ecology. Ecology is the science of living systems.

Ecology draws its understanding from the physical, biological and social sciences and ammalgamates them into the basic laws of ecology which apply universally to all known ecosystems.

If we examine technologies from the perspective of ecological principles we can often gain understanding on why existing technologies are environmentally unsound and also suggest ecologically wise alternatives.

The problem is that ecological solutions are not popular. They are expensive, they require life style changes, and they often take a long time to put into effect. However, if we are to believe the majority of ecologists who predict calamatous environemtnal deterioration in the next 25 to 50 years, we are soon going to have to re-orient our science and technology in an ecologically responsible direction. However, most ecologists are also realistic enough to know that this intellectual revolution is unlikely to occur in time.

The research funding bodies determine the direction that science takes. The old road which is presently the well funded dominant road leads in the direction of big and expensive science, high technology, increased specialization. The assumption seems to be that all we need is more and better science and technology and most of our problems will be solved. What this seems to ignore is that 99% of our present environmental problems can be traced back to previous ill-conceived science and technology.

The alternative road does not seek more information but better understanding of what we know now. It seeks to substitute wisdom for smartness. A basic attitude of the alternative road is that old science and technology is leading us towards disaster. By following the alternative road we

try to develop long term and ecologically wise solutions to problems with minimum environmental backlash.

The research methodology which I find most successful when seeking alternative solutions involves - trying to understand how an equivalent system works in nature and then attempting to emmulate it. This means that we try to work "downhill" with natural systems rather than "uphill" against them. This type of analysis usually also points out the ecological faults of existing technologies.

Let me illustrate this point with a few examples.

One of our civilizations proudest achievements is the development of the flush toilet. With an effortless flick of the wrist our wastes are flushed away to part; unknown and instantly forgotten. What we have actually done is violate a basic principle of ecology. This principle states that, in a mature and stable ecosystem processes exist which ensure that nutrients cycle within the system, with little being lost to down stream systems. The transportation of our wastes from our terrestrial ecosystem to the aquatic ecosystem is ecologically unsound.

By the same token the burial or incineration of organic garbage breaks the cycle, which should return these plant nutrients and soil conditioners to the soil.

Obviously it would be more ecologically responsible to accumulate and decompose human and kitchen wastes within the home and periodically return these wastes to the soil as nutrient rich compost.

The development of an alternative technology such as this would be ecologically sound because it works to reenforce, not defy natural processes.

Because we don't recycle plant nutrients we must replace them with chemical fertilizers. Now it has been truly said that plants can't tell the difference between nutrients from compost and those from fertilizers. However the soil organisms or decomposers can. These worms, arthropods, bacteria, fungi etc. feed on animal and plant wastes and decompose it to a form useful to the plants. When fertilizers are substituted for organic wastes the decomposers, a vital link in the nutrient cycle, are deprived of food so they disappear from the soil. When the soil becomes deprived of its organic component it becomes mineralized. As a result the texture of the soil deteriorates, and problems like; compacting, loss of water holding ability, and salt accumulation develop.

With the loss of the soil decomposers the diversity of the soil community becomes simplified. A basic ecological principle states that ecosystem stability is directly related to community diversity. This reduced stability in the soil ecosystem exhibits itself as disease outbreaks and plagues of pests.

In order to combat these, the chemical arsinal is trotted out. Fungicides further simplify the soil community, and insecticides by killing off the predators of the pest insects destabilizes the ecosystem.

This kind of ecology violating technology is going on all around us and it is at the root of our environmental crisis.

I would suggest that granting bodies should play it safe and provide funding for research into ecologically responsible technology so that if the system as we know it does collapse there is a background of information on such basic survival skills like how to grow food without

pesticides, how to build good soil without fertilizers and how to design an aesthetic and healthy composting toilet.

Another suggestion that I have is that a professional journal for alternative technology should be started. There seem to be no end of organizers and lobbyists promoting alternative technology or sounding the alarm for the environment. There are also lots of semiprivately run publications in which a small group of individuals promote their particular ideas. Unfortunately because of the narrow intellectual base upon which they are run, most become rather boring in a short time.

What is needed is a broadly based, adequately funded journal for Alternative Technology which would invite contributions. These should be screened by an editorial board. Such a journal would provide an outlet for serious workers and would provide credibility for the whole alternatives movement.

Man - Cancer of the Planet

Mike Gillis, CBC Commentator, "Land and Sea"

Introduction

The question posed by the phenomenal increase in the world's population in the past 180 years is this: was it caused by improved technology or did the increase to population act as the catalyst which fostered technological advances?

The recent history of the world makes a good model to impact technological progress on population trends and social development.

Population Growth

Prior to 1800, the population growth in the known world increased by approximately 1% per year to reach one billion in 1800. By the turn of the present century, the population had doubled to 2 billion. In the next sixty years the world population showed a billion and a half increase to stand at 3½ billion in 1960. Forecasts call for a population of 6-7 billion people by the year 2000 - and 20 billion by 2050.

Food

The agricultural revolution continues. Technology and science are two contributing factors in the increase in food production. Genetics when applied to plant and animal improvement in yield and performance increases the supply of food required to support a growing population.

The invention of farm machinery like the tractor and the combine, or the steel ploug permits mechanization and mass production. Electronics when applied to the fisheries increases catches by finding the fish and giving precision navigation where fish can be caught on a continuous basis.

The application of technology to land and sea is growing, harvesting, processing, transportation and distribution makes the world's food supply available to more people, in more countries than ever before. The question is what are the limits of t oceans and the continents to produce food? When will we reach the saturation point where numbers of people equal the total life-giving value of the food, energy, and services available to sustain life on the planet?

People vs. Food

The supply of food is greatest and more evenly distributed among the people in the highly developed countries of Europe and North America. This is the area of the world where populations are in balance, and food is often in excess of the requirements!

The under-developed countries of Asia, Africa, and South America have the highest increase in population, the lowest forms of technology, short food supplies and famines are common.

Canada's Place in the Global Village

Twenty-three million people occupy one of the world's largest countries endowed with abundant natural resources, a highly-developed technology, and a vigorous economy which must be the envy of overcrowded and less fortunate people.

What efforts must be made or will be made to help under-developed countries? Will Canadians destroy their own resources and disrupt their own lifestyles in order to avoid an exploitation of their natural resources?

Will the manufacturing sector of the economy dominate and dictate a reckless expansion of finished product to export?

Will Canada deplete her energy supplies and lower her ability to produce food?

As food demands increase, will we enforce safeguards to prevent the depletion of agricultural land, curtail overfishing and place restraints on the use of energy, forest resources, and minerals?

The population explosion poses problems for every country in the world. Canada will not and cannot escape from the effects of man's ability to reproduce regardless of what part of the globe the population increases take place.

Summation

As populations increase, the demand for food, services, and energy increases. Technical advances will and can be used to increase food supplies. Technology can and will be used to bring populations under control. The object must be to bring man in balance with nature. Death rates in balance with birth rates. Instead of drastic birth control measures, sterilization and abortions, the technical advances of electronics could be applied to mass communication on a global scale where trends in life styles could be influenced. The one to two child family would be the symbol of manhood and success.

Our space ship is becoming overloaded. Global problems are everyone's concern. We must keep our finger on the pulse of our own growth and expansion in every city, town and village and community, but the time has come when we cannot afford to ignore the repercussions and shock waves produced by the most prolific animal in the world- MAN.

DISCUSSION PAPER

ATLANTIC HCST CONFERENCE

HALIFAX, N.S. MAY 17, 1980

Gordon Inglis

Department of Anthropology

Memorial University of Newfoundland

This brief discussion is based upon a reading of the *Preliminary Report* of the Western Ontario HCST Conference prepared by C.A. Hooker (November, 1979) and two of the conference papers (Carpenter and Demirdache). Professor Hooker is to be congratulated on organizing the conference and on presenting an extremely full and thought-provoking report. If in what follows I take issue with some of his perspectives, it is not from a spirit of negative criticism but rather in the interests of contributing to what I hope will be helpful discussion.

In discussing the "human context of science and technology", or HCST, Hooker describes an area of concern delineated by interests in particular aspects and consequences of human activity, and with this I have no quarrel. I agree that problems -- especially problems defined by values -- do not come in neat disciplinary packages. I agree that the paradigms and institutional arrangements of traditional disciplines provide no means of tackling some problems and may impede research on some questions of human concern. I agree that interdisciplinary work is desirable, and even necessary. I do not agree, however, with the organizational conclusion that Hooker appears to reach from all this, and I am concerned about the extent to which his comparison with criminology becomes, not merely an analogy for heuristic pruposes, but a model of institutionalization.

Throughout his paper Hooker points to, and hints at, the creation of a new quasi-discipline -- an inter-disciplinary "HCST field" with its own "practitioners". He writes of "education for the HCST field" and argues that "the only reliable method" of overcoming disciplinary constraints on inquiry to to "have projects guided by people who have themselves personally crossed disciplinary lines". While the reasons for wishing to proceed in this direction are strong, it seems to me that it is at best premature and at worst a dangerous and unproductive course.

In spite of the complex inter-connectedness of our problems, it seems certain that the entrenched and institutionalized disciplines will persist. The hiving off of a new inter-disciplinary "field" could result in isolation of HCST concerns and the creation of a new set of vested interests, a new hierarchy, and another reason for traditional disciplines to ignore concerns that they should, perhaps, pursue. Something of the sort may already have happened in the area of Alternate Technology. Although much has been accomplished under that rubric, the field retains many of the attributes of a cult, complete with a lunatic fringe of faddists and a collection of entrepreneurial hangers-on. The real accomplishments in the field are frustratingly slow in penetrating societal institutions. A major goal of the SSHRCC, in my opinion, should be to encourage a broader acceptance of, and sensitivity to, HCST problems across the full range of disciplinary specializations, and I do not

think that this will be accomplished by institutionalizing a "field".

In any case, it is by no means guaranteed that inter-disciplinary work will be "better" simply because it is inter-disciplinary. It is tempting to think so if only because, as Hooker notes, disciplinary Establishments tend to be so suspicious of it, but that is as far as it goes. It is quite true, of course, that inter-disciplinary proposals are often frustrated by exaggerated scrutiny from the specialist fields; it is true that inter-disciplinary researchers often run into institutional barriers; it is true that the results of such work are sometimes denied legitimacy. It is also true, however, that inter-disciplinary work is hard to organize for reasons having nothing to do with vested interests; that the crossing of intellectual boundaries can be accompanied by a loss of rigour; and that the product may be a compromise rather than a break-through. Certainly, great intellectual advances have been made by people who have ignored or ridden rough-shod over disciplinary fences, but the record of consciously-constructed inter-disciplinary teams is not so impressive. Most of us are not great inventors; we are more like journeyman machinists. We do our jobs by applying established standards of method and canons of proof to the ideas that come our way. A prime objective of a strategic grants programme, as I see it, is to set more of us to work applying what we know to the vast complex of problems summarized in the initials HCST.

How may this be done if not by creating, explicitly or implicitly, a quasi-discipline? Mainly, I would suggest, by attempting to inject HCST concerns into <u>all</u> the granting programmes of the Council. Specifically this might be accomplished by including criteria of "human importance" along with the others used to judge grant applications in all fields. The immediate objective would be to elicit and support research proposals which, while they may be tentative and exploratory from the point of view of the discipline concerned, are directed toward significant areas of HCST concern. In the longer term, it would be directed toward establishing the academic "respectability" of work that may now be judged peripheral to mainstream disciplinary interests. This does not, of course, preclude the expansion of inter-disciplinary development -- indeed, it should enhance it.

Another important aspect of HCST concern, as Hooker notes, is communication -- not just among academic disciplines, but also among segments of our unprecedentedly-complicated society. It is probably correct to say that the solutions to some of the pressing problems of the society do not require more research -- the answers are already known, but are prevented from implementation by the segmentation of knowledge and ignorance, by societal attitudes, or by inability to articulate the problems in the first place. There is a need for synthesis, communication and popularisation of existing knowledge.

These are always controversial matters -- especially

popularisation -- but in my opinion these channels of communication are of fundamental significance. It is not only the case that many of the problems in the HCST field are inseparably linked to the needs, wants, and attitudes of the general public; it is also the case that most of the knowledge that even specialists in any given scholarly field may have of other academic specialities comes through essentially "popular" channels. For most scholars in the humanities and social sciences, any idea they may have of what is currently going on in biology or chemistry comes from watching David Suzuki on television, or reading popular books like The Double Helix. Physicists and mathematicians are likely to learn anything they know about anthropology from the National Geographic. The partly-educated mass public picks up a smattering from school text books selected more for design than for content, and from whatever the mass media money-makers want to give them.

With the last few centuries' accumulation of knowledge in specialized fields, it is inveitable that only a small amount may be transmitted from any given field to the general populace. Thus, the selection, condensation, simplification, and synthesis of knowledge becomes crucial if the society is to comprehend what it has created. It is not only the scientific world that is subject to what Hooker calls the "side effect syndrome" where "problems solved in one area create new problems in others". The whole society does that. The only way our choice-making, either individual or collective, can be improved is by knowledge

and communication, and that is too important a task to be left to chance and the market place. I would like to see strategic communication included along with strategic research.

REGIONAL CONFERENCE

HALIFAX, N.S.

THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY (HCST)

THE PERSPECTIVE OF ONE ENGINEER

VERNE IRETON, P.ENG.
DEPARTMENT OF MECHANICAL ENGINEERING
UNIVERSITY OF NEW BRUNSWICK
FREDERICTON, N.B. E3B 5A3

INTRODUCTION

I have read the Preliminary Report prepared by Professor C.A. Hooker of the Social Sciences and Humanities Research Council Workshop on "The Human Context for Science and Technology" held at the University of Western Ontario on November 30, 1979.

This report is obviously thoroughly and thoughtfully put together. However, I found it very difficult going, and somewhat like trying to shovel smoke. My mind is too simple and pragmatic to absorb and debate this material at this intellectual level.

In the western world, specifically in Canada, we do live in a technological society. Also we are human and social. Certainly science and technology influence and affect our human and social morals, ethics and values.

It is important to discuss, debate and research the subject of the Human Context for Science and Technology, but it is essential that the results of these exercises be understood and applied by all segments of society.

Position papers, reports, theses and any other documents which only consume space in libraries and archives without being used by anybody for any purpose don't seem to me to be very productive by any criterion.

ECONOMICS

It seems to me, after some years of experience, that things happen because of money and/or security of supply of some material or product.

When people are worried about the availability of something they respond somehow. For example, they hoard or change heating systems.

When the cost of something becomes too great or uncomfortably expensive people respond. For example, they insulate their houses, buy smaller cars or substitute. A change or new equipment now becomes "economic".

Very few things seem to happen for moral or ethical reasons, no matter how good these reasons are.

Therefore, one way of directing social evolution is through economics by developing and instituting policies which, without distressing the system too drastically, cause planned and ordered change. For example, Canada imports about 490,000 barrels of oil per day, principally into Atlantic Canada, at a March 1980 price in Saint John, N.B. of Can. $34.40 per barrel. The Canadian wellhead price is $14.75 per barrel for a difference of $19.65. This is a daily cost to Canada of $9.63 million and an annual cost of $3.51 billion. Canadians pay. How should Canadians pay--through taxes or through product prices?

What are the true costs for energy, and how do they affect our economic system? Maybe all Government subsidy and support for energy should be removed so that all sources compete on their own merits. What then would happen to the social structure of our society, and what would be the changes, if any, to our standard of living?

There is great fear among economists that introducing increased costs too quickly will have a very serious ripple effect

on society, and extremely high rates of inflation, as prices and wages attempt to keep pace. Therefore, can people in technological societies continue to expect an increasing standard of living, or should we somehow be trying to modify this aspiration?

ENERGY

It has been my personal opinion for several years, even before October, 1973, that energy is the most important social question of our time. Concerns such as the environment, pollution control, inflation, economic growth, population growth, and others are important, but are corollary to energy. How we handle the subjects of energy demand and energy supply will determine many things.

There is no question that technically developed societies squander and waste natural resources and energy. Somehow guidance and rules for the most efficient utilization of energy must be developed and put in place. At the same time, and later, the sources and procedures for energy supply must also be developed.

These topics are important and necessary subjects for research in the field of the Human Context for Science and Technology. The pressure is that advice and the implementation of policies are needed now.

One aspect of this subject that is worth considering is that there is a preponderance of opinion that it is important to use technology to ensure supply adequate to meet current and future demands. It is my opinion that manipulation and control of demand (conservation) is more productive. Managing demand auto-

matically affects supply, and may be lead to enlightened understanding of how to accomplish adequate supply in a fragile world.

I have personal opinions on the potential of renewable energies in the supply picture after having had several years of experience in the solar energy field, and the continuing need to develop and utilize the hard technologies after many more years in association with N.B. Power. Nowhere, it seems to me, is the significance of energy in our society being effectively explained to people. Neither is a quantity for particular tasks and an efficient total being explained, but this is no wonder because even the experts don't know these things.

There is need for local, regional and national projects and studies to determine how much energy is in fact being used for certain things, for example, what is the energy required to produce a chicken, and what is an efficient amount?

ENGINEERING

Because we live in a technological society, we need technically oriented and trained people to be active in public life. It is therefore possible that the study of engineering can be the most appropriate liberal education in such a society.

The practice of engineering requires an extroverted personality, in fact, however most students start from introverted personalities and more or less adapt during their professional careers.

An interesting and important area of research could be the development of technically biased programs of study intended to prepare people for public life. It would be important, as well, to learn how to attract or interest extroverted young people to the study of engineering, also with the intention of practicing

politics.

The engineering profession recognizes the importance of participation in public life by professional engineers, and so encourages it. However, that is not enough, and the social sciences and humanities need to make welcome and encourage technical participation in the government of the community, and in the development of guidance and policies for social change.

CONCLUSIONS

This presentation is purposely simplistic and perhaps dogmatic. I realize that this is not the way the world truly is, but it will be the most unusual intellect that will be able to absorb and synthesize all of the factors that are in play in our complex society.

My own attitudes are somewhat uncomplicated. I think it is important to establish priorities and try to accomplish something rather than spending indefinite time evolving some "grand plan" that can not ever be instituted.

Science and technology influence and affect human values. Things happen, it seems, because of money. Technical innovations appear because they can compete in the market place, and they then influence society somehow. This influence may or may not be good, however the net effect, I expect, is perceived by the majority to be good, and is indicated by an ever increasing standard of living. Only relatively few people seem to be able to distinguish between the notions "standard of living" and "quality of life".

The random and free growth of science and technology without

humanistic influence or their transfer to society are dangerous. Equally dangerous, however, is restriction of science and technology based on ignorance and fear of the subjects.

One subject of particular importance is energy--its demand and supply. Here are some of the greatest challenges to all members of society, and especially to those who lead and direct us.

It is important to somehow encourage technically oriented people to participate in public life. Engineers, contrary to some opinion, are people too, concerned with the world we all live in, and particularly interested in helping to make the world a better place.

I certainly welcome the opportunity to prepare this paper, and hope it contributes positively to the deliberations of the workshop. I apologize for the haste in its preparation.

VALUES, TECHNOLOGIES, AND HIDDEN ASSUMPTIONS

A Position Paper

By

Robert C. Kaill

The concept of value refers to human preference. Technology has to do with the means by which such values acquire concreteness. In a finite world, value options are circumscribed, hence, decisions regarding the development and utilization of technologies represent competing values. Decision-making with regard to competing values, in turn, implies the existence of subterranian criteria. These criteria represent human priority.

Technologies will not be generated or utilized except where the consequence represents the anticipated realization of the human priority.

In order for value choice to occur and the process of the implementation of technologies to be set in motion, a kind of cost-benefit analysis is necessary. For example,

in the field of medicine, the development and use of equipment related to patient care involves choices in the expenditure of research time and funding. The ends to which such equipment may be put are likely to involve relief of suffering of physical or emotional suffering, the minimization of disablement, or the extention of human life. In making decisions regarding these values, it becomes necessary to develop equations in which particular amounts of pain or disablement are balanced against mortality rates. Only on the basis of such implicit or explicit calculations can practical determinations related to the use of human and physical resources be determined. Such cost-benefit analysis must also consider the efficiency of the various alternatives - How much human and physical resource will produce particular benefits. The economies of input and output cannot be ignored in a situation of limited resources. Considerations of the sort referred to above, having to do with medical practice, have scarcely been addressed in the literature, except perhaps, in discussion of euthanasia, in which, in negative terms, cost-benefit analysis with regard to human suffering and mortality have received some attention.

Discussion of values related to such critical issues, as mortality and human suffering often mask the deeper

assumptions which remain implicit. Such discussion, for example, normally assumes the positive value of longevity, other things being equal. Such a value is, by no means, self evident. Again, in debates over human relationships, there is all too commonly an unrecognized assumption that harmony is to be prefered over conflict. Numerous social therapy techniques take this as a given. In a not unrelated development in the field of values education, a trend appears to be developing in which a somewhat naive claim to "values-neutral" orientation (values clarification) is being overtaken and supplanted by a strategy which explicitly attempts to encourage moral development in a preferred direction (cognitive moral development). In other areas, biases assume a more mundane form. For example, one may suppose that a considerable amount of technologically-oriented research is undertaken, not primarily as an acknowledgement of important human values, but because funding has been made available by a particular private corporation or public agency. Nevertheless, since these structural realities are a part of our culture, and do have this type of influence on academic and other intellectual pursuits, they should not be ignored or overlooked in any investigation of the relationship between human values and technology.

Finally, it should be recognized that systems of priority or ultimate commitment, out of which human values are generated, are embedded in culture, and learned through the process of socialization. Cultures embody orientations and perspectives. The argument in this paper is that one need not deny nor be apologetic for such commitments and orientations, since they are part of the very web of culture. What is being argued here is the need for recognition of these inate and usually implicit positions. This level of sophistication in the approach to decisions related to the development and control of technologies in the service of human values will help ensure sensitivity to the roots from which cultural values have sprung, along with some appreciation of the realistic boundaries for immediate change.

THE HUMAN CONTEXT IN ATLANTIC CANADA

by

John R. MacCormack

(Opening address given to the Atlantic Regional Workshop on "The Human Context of Science and Technology", held on May 17 and 18, 1980, at Saint Mary's University, Halifax, N.S.)

In this workshop we will be considering many aspects of the problems which advancing technology poses for the human race as a whole. We will also be considering the impact of these changes on a particular society: the Atlantic provinces of Canada. There are those who might argue that change in this region can only be for the better and that far from looking with critical eyes on economic development, we should thank our lucky stars that the long dark night of economic depression is at last showing signs of ending. For these people the phrase: "depressed area" says it all. They tend to assume too that economic development can be equated with social betterment in a kind of one to one relationship and that regions which suffer economic delcine in some obscure way deserve their fate, and that their social and cultural achievements can be safely discounted.

But if we are to take seriously the task before us we must first ask whether or not there is anything distinctive about life in this region that is worth preserving and that is sufficiently valuable to be put in the balance against this or that mode of development.

Visitors from other parts of Canada and the world often remark on the distinctive character of these provinces and they see this as applying not only to the geography but to the people themselves. During the war, many servicemen from other parts of Canada would remark: "you people know how to live down here," and they seemed to feel that this more than made up for other deficiencies.

If Atlantic Canada does have a distinctive character, in what does it reside, and what is its origin?

When we compare and contrast this region with the rest of North America we are struck by a number of significant factors which have combined to produce a society which has achieved a kind of homogeneity and identity despite, and to some extent because of, the varied origins of its peoples. That homogeneity is to some extent a function of economic stagnation. By 1830, with the exception of the refugees from the Great Hunger in Ireland in the 1840's, immigration to this region virtually came to an end. The great flood from continental Europe which started after the Civil War and continued to 1914

passed this region by almost completely. The 19th century, which saw the rapid industrialization and concomitant urbanization of much of the western world, witnessed the opposite process in Atlantic Canada. As big capital remorselessly swallowed little, Ontario and the Eastern United States were the residuary legatees; the Maritime provinces the consistent losers. One hundred years of out-migration and disappointed hopes have reduced the collective self-image to such an extent that one of the most pressing tasks of those, who would grapple effectively with the problems which we are addressing, is to sharpen that image and restore the self confidence that was once here in abundance.

In the last hundred years time has virtually stood still for this region but, for those who view the period in question with a somewhat jaundiced eye, this may have its merits. If some of what we had was well worth preserving, there may be positive aspects to being passed by. The fact that the values of the people are derived in the main from medieval Europe and 16th and 17th century England and Scotland may, from the standpoint of the moral bankruptcy of our time, seem almost a matter for congratulation.

But there is more to it than that. The people of this part of the world have a clear grasp of the relationship between moral values and freedom. Most have ancestors who have suffered for their beliefs. The story of the Acadians is familiar enough; it is perhaps not as well known that an expulsion took place on Prince Edward Island as well as Nova Scotia. The New England Baptists who replaced them could look back on a long history of persecution both in new and old England as well as to a significant contribution to constitutional liberty in both countries.

Religion has been both a divisive and unifying force. The Catholic Acadians and the Anglican Loyalists of New Brunswick have occupied two solitudes, and religious tension and conflict is part of the history of Nova Scotia, Newfoundland and Prince Edward Island. But these tensions have been creative as well as destructive.

The three values of truth, personhood and freedom are interdependent and cultures can be assessed in terms of the character of the interaction between them.

If we apply this triad to the Atlantic region we uncover some clues to its character. A high percentage of Maritimers and Newfoundlanders are descended from people who have known tyranny and oppression in various forms and who have suffered for their beliefs. The Catholic Acadian French, the Anglo-American Baptists of the Annapolis Valley, the Anglican Loyalists of Nova Scotia and New Brunswick, the Presbyterian and Catholic Highlanders and the Irish of all four provinces, have all known

the relationship between values and freedom in a historical reality. Religious values have been seen as the basic influence behind the establishment of communities in the first place, and the central core around which institutional development took place.

The interdependence between knowledge and values has been as much part of the historical tradition of the region as has that between values and freedom. Education has been closely linked with religion and has been the motivating force behind the establishment of schools and universities. In Nova Scotia, it was the Anglican Loyalists who established King's, the Presbyterian Scots who were the true founders of Dalhousie, the Annapolis Valley Baptists who developed Acadia, the Catholic Irish who started Saint Mary's and Mount St. Vincent, the Catholic Highlanders who founded St. Francis Xavier and the Acadian French, St. Anne's. In New Brunswick and Prince Edward Island, Mount Allison, St. Thomas, St. Joseph's (now the University of Moncton) and St. Dunstan's owed their origins to the determination of the people to place their faith in a context of intelligibility. In Newfoundland the same impulse resulted in a school system closely linked with the religious traditions of the island.

Rationalistic social engineers have regarded this type of development with a kind of holy horror. Indeed many of us have felt somewhat apologetic about the multiplicity of institutions of higher learning in the Maritimes. We need not be. I would argue that when we ask why this region has produced far more than its due share of Canadian leaders in all walks of life, including the scientific and scholarly, the answer can be found in the institutions which answered the felt needs of a community and which placed the values hierarchy of that community in an intelligible context. We have here two competing concepts of community. One deriving from 18th century rationalism which produced a school system in France which enabled a French government official to look at his watch and say: "At this moment all the students in France of fourteen years of age are studying mathematics." The other, older tradition has always recognised explicitly or implicitly what is called the principle of subsidiarity: that the aim of a true community is not to achieve total homogeneity but to nurture the legitimate aspirations of its constituent parts, which in turn will produce that creative tension upon which personal and social development depends.

In many of these matters, the world has come full circle and the oft-criticized failings of Atlantic Canada have suddenly become virtues. Everything is up to date in Kansas City, but we must admit that it is more by historical accident than by design. The multiversity has been debunked and the megalopolis is now seen to be the dehumanising ant-heap that

it is. The question we have to ask ourselves in this region is this: if we already have the kind of community that for most people on this continent is gone beyond recall, must we go on mindlessly repeating the same mistakes?

Until recently socialists and exponents of unrestricted "free enterprise" have been in fundamental agreement in assuming that increasing the gross national product would inevitably lead to the good society. They disagreed only on the question as to who should control the enterprise. Thus the Soviets drove the peasants off the land and rationalized agricultural production, firmly believing that this would lead them to the promised land. We, in North America, are doing substantially the same thing. We assume, apparently, that we need not worry about transforming independent farmers into wage-earning tenants and destroying the raison d'etre of our small towns. This is a particularly pressing problem in the Atlantic region at the moment because this area contains the last acreage of arable land which is not fully exploited. If the usual scenario is followed, the Annapolis Valley and Prince Edward Island will become the domain of large agro-corporations and the people will leave for the big city. In the Roman Republic slaves replaced the yeoman farmers. It was the beginning of the end for Rome. In our day the computer-operated tractor does the job.

"You can't stop progress", we repeat mindlessly. What we lack is any criterion of progress apart from following the bottom line wherever it leads. Questions which are not asked, let alone answered, include: what are the advantages in terms of human and social development of having the population distributed in small towns rather than concentrated in one or more large cities? In Nova Scotia, for example, we have the largest proportion of our population in small towns than any other province in Canada, and the pattern is similar in the region as a whole. We need to know more about the social advantages of such a distribution. A useful exercise might be to take the population of Nova Scotia and compare it to a North American city of the same size. I would suspect that we would find that the opportunity to involve oneself in community affairs on various levels is much greater in this province than in a city of comparable size.

Some years ago we carried out a survey of the academic resources of Nova Scotian universities with the object of discovering how the collective strengths of the various departments compared to large universities in other provinces. We found that in all the standard disciplines the "University of Nova Scotia" was far stronger in terms of holders of the doctorate. Thus the student here would have a much better chance of encountering a fully qualified professor than one at, say, the University of Manitoba, British Columbia or McGill.

Bigger, in this case, is not necessarily better. A question which might be considered in the area of appropriate technology or perhaps more appropriately in that of information economy, is to what extent can we employ electronic means to maximise the benefits of our university distribution in terms of faculty interaction while retaining the benefits of small scale operation?

We have in Atlantic Canada a distinctive community, culture and way of life. The future seems to hold the possibility of rapid economic development and perhaps industrialization. We are faced with a challenge, which is also an opportunity, to give much needed leadership with respect to a central problem of man in our age.

Comments on the Preliminary Report

Philip McShane

The dense and lengthy preliminary report of C. A. Hooker and his associate T. Burrell calls not for brief comment but for prolonged effort and, indeed, points up what Hooker noted in discussion: "the importance of continuing this process to promote interaction and collaboration".[1] For this verv reason I keep my comments as brief as possible, restricting them to some few particular parts of the report which lie close to my own field of interdisciplinary procedural analysis. So, I will relate what I have to say principally to the first paragraph of Third (p.12) in Part II, the diagram of p.18 in Part III, and the issue of Framework Challenges raised towards the end of that part (p.27).

The framework challenge I have in mind is that expressed on p.12, "of grasping self-consciously the design of our society and environment, critically debating the merits of alternative designs, and possessing (at least some) means of effecting desired design changes". I wish to treat first of the difficulty, then of the nature of the challenge.

Perhaps before moving to a broader canvas, the case-history of a project not unlike our own may serve both as illustration of the difficulty and as a cautionary tale.

Harvard University, a few years ago, undertook the task of revising its undergraduate programme (the results were implemented in the fall of 1979). It did so with what seemed a largeness of vision: "an educated person should have a critical appreciation of the ways in which we gain knowledge and understanding of the universe, of society and of ourselves".[2] But the report gives evidence of the dealing of an old deck, with the addition of a handful of new committees, when what was needed was not a new deal but a new deck.

The issue lies deep in the cultural and academic acceptance of paradigms of knowing and evaluating flowing from 14th century Europe which are so internally structured as to exclude their own questioning. But their externality, to be found in the rot of patterns of education, business, government and daily life, what Eric Voegelin calls "the murderous grotesque of our time",[2b] is forcing the contemporary mind to reassess its roots. So, for example, Leo Strauss exposes the warped grounds of modern politics,[3] and Nicholas Kaldor identifies two centuries of fundamental disorientation in economics.[4] But such exposure and identification is not enough. Peter Drucker, a founding father of modern management studies, can even seemingly get close to the issue in such remarks as "a man who knows only the skills and techniques, without understanding the fundamentals of management, is not a manager;

he is, at best, a technician:"[5] Yet he comes no closer than the Harvard Committee to focusing on the real task.

What is that task? It is precisely the reassessment by mind of its roots, where those roots, true or warped, are primarily not in history books, or in the decayed economy, or in the manifest inefficiency and unkindness of business, or in the gross overgrowth of government. The roots to be assessed are primarily in the individual mind; the fundamentals of management lie unrevealed in the dynamic consciousness of the manager; the radical issue to be personally faced is the issue of truncated subjectivity. "The neglected subject does not know himself. The truncated subject not only does not know himself but also is unaware of his ignorance and so, in one way or another, concludes that what he does not know does not exist".[6]

The central difficulty should now be more evident: truncated subjectivity is blind to the basic issue. It can even, like Stephen Toulmin, advert to a major element in its own blindness and still side-step the issue: "The term <u>concept</u> is one that everybody uses and nobody explains... still less defines. On the ond hand, the word has familiar currency in twentieth century history and sociology, psychology and philosophy alike. For many twentieth-century philosophers, indeed, concepts provide their central subject matter, their

very bread and butter...Many of them would even describe the central task of philosophy itself as being that of conceptual analysis. Yet, despite all their scrupulous care in the actual practice of conceptual analysis, the precise meaning of the terms "concept" and "conceptual" is rarely made explicit and frequently left quite obscure".[7]

The issue, of course, is not just the presence in our philosophy departments of the disorientation of Scotus' misrepresentation of mind. It is, above all, the established prolongation of truncation in our educational tradition.[8] So, as Kuhn's work would warn us, the discovery of truncation and the effort to draw attention to it so as to change the statistics of its presence must surely live with no more optimism than Max Planck expressed regarding the old theory holding its own 'till old age retired it from professorial chairs.[9] Just as Newton's absolute space still haunts discussions of paradoxes in Relativity Theory[10] and Quantum Mechanics[11] long after Einstein has shifted the foundations of physics from conveniently objective axioms to subject-grounded principles,[12] so the pseudo-objectivity of Scotus and Kant will long continue to hold its present sway and systematically exclude "The Human Context".

To personally challenge that sway is first to advert to the fact that one can talk with facility about knowledge,

science and values without moving to the suspicion that one's efforts to know and evaluate remain data, easily named without being seriously understood. It is, furthermore, to move slowly towards an understanding of those activities in oneself to discover in an empirical fashion the dynamic structure of one's own consciousness. I speak of empirical method, and I mean a well-defined generalized empirical method which does for the data of consciousness what empirical method does for the data of sense.

With regard to modern empirical method Stillman Drake notes that before Galileo there was no dearth of mathematical reasoning but "the systematic appeal to experience in support of mathematical laws seems to have been lacking...The design of experiments to discover new mathematical laws comes after Galileo's time".[13] Drake notes the difficulty of believing this, and so goes on to describe the inadequate strategies of such men as Tartaglia (1546), Cardano (1570), and Ubaldo (1577) in seeking out laws of force for bodies on inclined planes. In the twentieth century there has been no dearth of debate in methodology and so-called empirical psychology. But appeal to one's own experience of procedure, of questioning, of discovery, far from being present in any systematic fashion, is most regularly systematically excluded. The identification of the relevant generalized empirical method and its basic strategies

has been the central achievement of the Canadian thinker Bernard Lonergan.[14] The attention it requires to the personal procedures concommitant to the normal attention of earlier science and human studies responds to the crisis of methods that has been accumulating steadily since the revolution in natural sciences and the emergence of nineteenth century German historical studies.

Obviously even an indication of such a fundamental methodological reorientation is not a matter of a few concluding paragraphs, but some hints of the emergent structure are necessary in order to give some meaning to my final diagram which I think can lead to some unity of integrated studies and, in particular, throw new light on Professor Hooker's diagram(p.18).

To get beyond a present culture of self-neglect and truncation is to seriously undertake a self-attention that reveals oneself to oneself as a structured consciousness: as one whose what-questions pivot on sensible attentiveness, as one who asks 'is-it-so?' only when 'it' has the consent of a what-answer, as one who asks 'what is worth doing?' only when is-answers have revealed the state of affairs. So one arrives at some notion of the dynamics of one's own attention, intelligence, reasonableness and responsibility. Moreover, one can go on to discover the cultural invariance of the four-levelledness of human consciousness: the dynamics of modern Japanese business

consciousness manifests the same structure as the entrepreneurs of early Egyptian agriculture, or indeed, as the Hebrew prophet or Greek philosopher.

Furthermore, the discovery of that four-levelled dynamic of human consciousness grounds a proper ordering of integrated studies. For, human history is a pattern of progress or decline where these have meaning from the sequence and interlocking of attention or inattention, intelligence or unintelligence, reasonableness or unreasonableness, responsibility or irresponsibility, and future progress depends on discovering patterns of progress in the past and in ourselves. Since the structuring of such integrated studies is treated extensively elsewhere[15] I will be content here to add a diagram indicating a functional organisation of studies. Eight functions are noted. I would relate them as follows to the content of Professor Hooker's diagram (p.18); (my comments move across his page):

<u>Function</u>

1 - 8	problems vary with each functional specialty
1 - 3	Empirical Studies e.g., History of Science and Technology
7	Sociology of knowledge
4 - 5	Normative Studies e.g, philosophy of science, strategic theory, values roles in Science/Technology.
6	Policy
5	(The Contents of the Centre Rectangle)
8	Decision (execution) and Information Processes (Communications)
4	Policy Evaluation
3	Policy Analysis
6	Policy for Science/Technology
8	Appropriate Research Institutes; Appropriate Technologies.

Note that the functional specialties operate in a vortex 1 to 8 to 1 etc: this structure replaces the arrow system of the Hooker diagram.

<u>Functional Specialties of Integrated Studies</u>

1. Research 2. Interpretation 3. History 4. Dialectic 5. Foudations 6. Policy 7. Systematics and Planning 8. Execution and Communications.

	Reflection on Past	Orientation towards Future	
4	Dialectic evaluation of content of previous functional specialties leading to expression of foundations	Normative Foundations of Sciences and Technologies, Cultures, Arts, Life-styles.	5
3	History of views on evaluation etc., of actual evaluations and their concrete consequences	Emergent Policies for particular groups.	6
2	Interpretation of texts and data	Ongoing Systematics and Planning	7
1	Accumulation of data relevant to past views of evaluation, knowledge etc., and their actualization	Execution and Communications	8

Notes:

1. Annex 4, p.51: I have taken the liberty of numbering the pages of the report 1-52, beginning with the title page.

2. "The Harvard Report", The Chronicle of Higher Education, March 6, 1978 (Vol.XVI, no. 2), 15.

2b:see p.10

3. Leo Strauss, "The Three Waves of Modernity", Political Philosophy. Six Essays by Leo Strauss, Ed. H. Gilden, Pegasus, Indianopolis, 1975.

4. N. Kaldor, "The Irrelevance of Equilibrium Economics", Economic Journal 82 (1972), 1237-1255.

5. P. Drucker, Management, Harper & Row, New York, 1974, 17.

6. B. Lonergan, "The Subject", A Second Collection, Darton, Longman & Todd, London, 1972, 73.

7. Stephen Toulmin, Human Understanding, Vol. I, Oxford, 1972, 8.

8. I have dealt with this at some length, with regard to higher education, in Lonergan's Challenge to the University and the Economy, University Press of America, 1980.

9. M. Planck, Scientific Autobiography and Other Papers, English translation, F. Gaynor, New York, 1949, 33.

10. The classic controversy in special relativity is between McCrea and Dingle in Nature, 1956-57. The paradoxes also became topics in general relativity: cf. Möller, Theory of Relativity (1952), 258.

11. A recent instance of confusion in Quantum Theory is Bernard d'Espagnat, "The Quantum Theory and Reality", Scientific American, November 1979 (Vol.241, no.5), 158-81.

12. See Patrick Byrne, "The Foundations of the Theories of Relativity", Creativity and Method: Studies in Honor of Bernard Lonergan, Ed. M. Lamb, Marquette University Press, 1980.

13. Stillman Drake, Galileo Studies, The University of Michigan Press, 1970, 44.

14. Particularly in Insight: A Study of Human Understanding, Harper and Row pb., New York, 1978.

15. B. Lonergan, Method in Theology, Darton, Longman & Todd, 1972.

2b. E. Voegelin, "Reason: The Classical Experience", The Southern Review, July 1974, 251.

Working Paper

on

TECHNOLOGY AND THE FAMILY FARM

prepared by

S. I. Pobihushchy
Department of Political Science
University of New Brunswick
Fredericton

for

Workshop on

THE CONTEXT FOR SCIENCE AND TECHNOLOGY

Saint Mary's University
Halifax
May, 1980

When Prof. MacCormack asked me to prepare a working paper on the effect of technology on the family farm for the workshop on the Human Context for Science and Technology, I looked upon his invitation as a challenge, but after I thought about the subject matter for some time and did a little bit of research on it, I soon appreciated that that invitation was more of an intimidation than a challenge.

Before moving on to the matter of technology and the family farm, I would like to make a few comments on the preliminary report of last fall's workshop at the University of Western Ontario. There is much in the report that is commendable. It is comprehensive, detailed and coherent. Of course I do not have the competence to comment intelligently on most of its contents. I would however like to draw attention to a statement made on page 6 of part two. That statement reads as follows: "But we currently know very little about central aspects of the science/technology-society interface." I think that I must take issue with that statement. We know much more about the science/technology-society interface than we care to admit. Technology, after all, is the use of nonhuman energy to displace and to reduce human efforts; thus technology does or can have a bearing on any or all human endeavours. We do have the technology to maximize the immediate benefits of those who have the capital to invest, but we do not utilize our technological knowledge on behalf of those for whom it is not immediately profitable for us to do so -- the northern natives, for instance. It is this differential in the utilization of our knowledge that I want to apply to the position of the family farm. But first, to illustrate the thrust of my argument, let me discuss for instance, the implications of a northern pipeline.

The continuation into the future of the present status of the well being of this society involves us in a frantic search for new and more energy sources. Results are starting to some in. We learned last fall that Esso Resources Canada Ltd. had discovered a significant field of oil at Norman Wells in the Northwest Territories. There are 250 million barrels of recoverable reserves in that field and it would cost approximately 300 million dollars to develop the facilities necessary to extract those reserves, but

the oil does not do much for the energy needs of Southern Canadians unless it is transported form Norman Wells to the south.

There is a proposal before the National Energy Board now to construct a pipeline from Norman Wells to Zama, Alberta, a distance of approximately 560 miles, at a cost of roughly 360 million dollars. If the National Energy Board gives its approval to the drilling of oil wells, the construction of artificial islands in the McKenzie River, and the construction of a pipeline, then oil could start to flow through that pipeline by the end of 1983, assuming of course that approval comes. Now I would like to place this energy resource project into the context of what we know. First of all, Canada uses almost 2 million barrels of crude oil every day. That Norman Wells field contains 250 million barrels, which satisfies Canada's crude oil needs, at present rates of consumption, for approximately 130 days. Now this is knowledge that we have at our fingertips. We also have at our fingertips the warnings of the Berger Inquiry.

In 1977 Tom Berger submitted his report of the McKenzie Valley pipeline inquiry to the government. Now it is not difficult for me to conclude that his report is one of the most thorough, comprehensive, competent and perceptive reports ever produced for any government in the history of Canada. His report calls for a 10 year moratorium on all resource developments, but especially energy resource developments, because such developments threaten the very existence of the natives and the way of life which they cherish. That report calls upon the Federal government to negotiate agreements with the native people throughout the North that will give those people a significant say in the development of resources in their lands. Only in this way could the survival of their way of life be assured. Berger expected that these negotiations could be completed within the next ten years.

As we all know, the proposed McKenzie pipeline was intended to bring natural gas from the Beaufort Sea and the North slope of Alaska through to the south and into the United States along the McKenzie valley. Judge Berger recommended against the construction of that pipeline at that time because of the phenomenally undesirable environmental impacts. Our Government's response was to approve the construction of the Alaska Highway pipeline instead, with the Demster lateral, which would have almost identical consequences. Negotiations

with the native peoples of the north have not been completed; as a matter of fact they have not progressed at all since 1977. We have the knowledge of the impact of these kinds of developments on the ecology, and on human beings, and on cultures and entire societies, but as long as we can deny having that knowledge we can move ahead, extract these resources to satisfy the energy needs here in the south of Canada and indeed in the United States as well. This case simply illustrates the extent to which we are prepared to overlook part of the knowledge available to us, because it is not in the interests of elites in our society to act in a way consistent with that knowledge. In fact, it may even be contrary to those elite interests to use such available information.

One of the problems that confronts me immediately upon considering the matter of the effect of technology on the family farm is just what is a family farm. Well, for the purposes of this paper I have decided to view the family farm as a way of life. It is not a job, it is not a place to live, it is not large spaces, it is all of these and more. The family farm as a way of life occupies each member of that family in the production of goods by way of growing vegetables, grains, hay, raising livestock and producing a variety of dairy products. There are two very important characteristics associated with this way of life. Those engaged in it are closely associated with the land, with the soil; and those associated with this way of life involve themselves in a great deal of manual and physical labour. Most, if not all, of that labour is contributed by the members of the family who together own the land upon which they work. The very nature of the relationship between the family, its members, the land and the livestock, requires that they be close to that land and close to that livestock always.

Family farmers are jacks of all trades; on the one hand they must provide the unskilled and skilled labour associated with blue collar workers in industry, on the other hand they must provide the management and administration functions so often associated with the white collar workers of our modern industrialized cities. Another important aspects of the family farm as a way of life is the fact that those engaged in it perform this

variety of functions with a variety of concomitant skills, not because of the financial and economics benefits accruing to them, primarily, but because they happen to place a high value on the relationship between themselves, the land and the livestock. Now, it goes without saying that the family farm has witnessed a considerable number of changes over time. The mixed farming which I have discribed above which was so typical of all family farms not too many years ago is becoming increasingly rare. A specialization has forced itself upon the family farm, and now threatens its very existence. For instance, in the province of New Brunswick in 1961 there were well over 8,000 family farmers significantly involved in the production of potatoes. By 1976 -- a mere 15 years later -- just 900 farmers were left in the production of that commodity. By 1979 this number was further reduced to just over 500. In the same province in 1969 there were approximately 80 family farms involved in the production of eggs. Today there are roughly 80 farmers engaged in that same endeavour. What is of significance to us about this is that the farmers who are today involved in growing potatoes are involved in little else, whereas 20 years ago they were involved in the raising of livestock and the production of other kinds of crops as well. This, of course, also applies to the egg producers. It is not only the province of New Brunswick that has experienced this kind of specialization in agriculture -- a drastic decline in the number of farms, and the increasing specialization of farm life has been the common experience of agriculture across North America.

The jeopardy in which the family farm finds itself has not gone unnoticed. In the last decade, every province in Canada has studies and reported on agriculture and the family farm. Each one of those studies indicates a strong commitment by all the provinces to the family farm. In addition, the Federal government has rededicated itself on numerous occasions to the survival of the family farm. One might say from all of this that the family farm is a very important institution in Canada by various governments, the number of family farms continues to decline, and specialization in agriculture continues to increase.

Given, especially, government concern about the survival of the family farm, this trend is, at the very least, perplexing. With the possible exception of the oldest profession, the family farm has been and continues to be, the most efficient enterprise in North America. Contrary to popular opinion, the large specialized farm is less efficient than the family farm, its products more expensive. As the proportion of food stuffs provided by family farms declines, the costs of those foodstuffs to consumers increase. In addition, the large specialized farm, or agribusiness, is associated with the breakdown of soil, and consequently soil erosion, the pollution of the environment by pesticides that are so heavily relied upon in the agribusiness, and increasing levels of unemployment in an increasingly urbanized society.

The argument that I wish to make here is really very straightforward and unsophisticated. Technology has facilitated that take over of agriculture by the agribusiness and has therefore assisted, if you like, in the elimination of the family farm. The move towards ever increasing specialization occasioned by this variety of technological innovation is associated with an increasing dependence that the farmer has, not so much on those technologies, but on those who own and control them. What I wish to do now is to present a rough conceptual image that would help us appreciate how this happened, that is, how it was that technological development facilitated the elimination of the family farm. Imagine if you will the family farm as the centre of a series of concentric circles. The inner circles represent the various technological developments that have directly affected agridulture over time. Without being entirely comprehensive about this review we could start with mechanization, then we could consider automation, electrification, the advent of chemical fertilizers, insecticides, pesticides and herbicides. Each one of these has directly impacted upon the family farm. Utilization of innovations of this type takes large concentrations of capital, often supplied by the very firms which sell the technologies, thus creating a dependency by the farmer on those who own the technologies. If the farmer were to take advantage of any one of these technological innovations each one of which was directed at increasing production, then he had to increase the capitalization of his farm, which usually, if not always, meant a growth in the size of the farm. Because of the nature of the new equipment required and its exceedingly high cost, the farmer had to move away from diversity in the direction of specialization.

Attendant upon that specialization is the destruction of the soil structure, erosion and the various forms of pollution about which more and more concern is being raised, but this is really not the subject matter for this paper. As the family farm, or any other farm for that matter, becomes more and more dependent on those who own the technologies, then of course the farm enterprise is utilized primarily to benefit those who control the technologies that the farms use.

If we return to the conceptual image of concentric circles again, those farthest from the centre can be viewed as representing a number of technological innovations that have had important but indirect effects or impacts upon the family farm. Developments in communications, transportation, refrigeration, food processing, storage and distribution have all forced specialization and an increase in size on the individual farm. As the technological developments in food processing, storage and distribution have enabled an increasing concentration of those industries in fewer and fewer hands, those hands have been able, increasingly, to play one farmer off against another practically anywhere in the world in order to obtain agricultural products at the lowest possible prices and often, at less than the cost of production. These economic and technological developments have forced the family farm to the very threshhold of extinction. The void in agriculture is filled by that new phenonmenon, the agribusiness, which most often is owned by the same interests that control the various technologies used in agriculture.

I earlier suggested that it was perplexing that, on the one hand, governments express such serious concern for the survival of the family farm and on the other hand there is a trend towards their virtual disappearance. If we look just a little bit more seriously at what we know, this perplexity starts to disappear. Although governments say they are concerned with the survival of the family farm, they in fact do nothing to ensure its survival. As a matter of fact, their actions are in the direction of providing the necessary conditions for the maximization of the return of investment in those technologies that farmers use. In other words, governments find themselves in a bind or in a conflict: on the one hand, to act in such a way as to ensure the survival of the family farm, the best interests of large investors are not served; on the other hand, to satisfy the needs of heavy investors, the best interests of the family farm are not served. It is obvious, therefore, that a choice has been made. The fact that the family farm is rapidly disappearing indicates clearly where our governments stand on the issue.

COMMENTARY ON HOOKER'S HCST PROPOSAL

BY GEORGE SANDERSON ST. F.X. UNIV. DEPT. OF PHILOSOPHY

General Remarks

Despite Hooker's great efforts it is still hard to get a mental grip on the HCST field. Ordinary ways of thinking betray us. Dividing in order to conquer, we are captured by our own divisions. We will not be rescued by a super-concept, but by a series of dynamic images which suggest the elements of the field. Because we are dealing with processes and not with static "things" our images or models must have special qualities (i.e. they must be dynamic, simultaneous, interpenetrating). HCST work itself involves a collaboration similar to that of an orchestra rather than the more stable image of an army or an organizational hierarchy chart.(1)

I think Hooker's report leaves out a number of things but I will come to these after presenting some concrete proposals for HCST work in our Atlantic region based upon my own experience in this field.

The SAIRA Experience

In 1973 I helped to start an interdisciplinary effort at St. F.X. which we called the Strait Area Interdisciplinary Research Association (S.A.I.R.A.). We came into being because the government of the day announced the likelihood of a massive refining and petro-chemical complex on the Mulgrave side of the Strait of Canso. Developers such as Shaheen were courted. Our group was anxious that the implicationsof the projected rapid industrialization of this rural area be examined. We wanted impact studies and discussion. We had representatives from eight University departments in our group We were mostly junior, untenured faculty but we worked hard without any friction. We folded after two years. Shaheen became interested in Newfoundland, other developers failed to materialize. The notion of appropriate technology gained ground. The big plans for the Strait began to shrivel. Several members of our group left the University. Our work had really just begun and should have continued but their departure demoralized us. We had received no financial or moral support from the University and we were unable to locate other groups similar to our own from which we might have received ideas, advice or encouragement. I do believe we had some influence

(1) It may be that recent discoveries about left and right brain operations will help to develop ways of thinking and perceiving that would allow us to create and maintain the unifying images or models we need for collaboration and discovery.

on events but this would be hard to demonstrate. As a result of this experience I would like to make the following concrete proposals.

1. External funding is crucial in the Maritime area where most of the universities, because of size and small endowment, are unable to risk irritating governments or industries upon which they are financially dependent.

2. For the same reasons we need an umbrella institution or institute which can serve as a center for groups or individuals in the region. HCST workers could then operate under the overt patronage of such a center. In our own case the Institute of Human Values would serve as a kind of real or nominal sponsor for local chapters or groups scattered throughout the region.

3. Because of our geographical isolation and our sparse population there is an urgent need for fairly frequent meetings so as to maintain the energy and determination involved in this kind of Action-Theory situation. Informal meetings or symposia or working sessions held say, four or five times a year, would be invaluable. The Umbrella Institute could well serve the vital function of organizing these meetings.

4. Newsletters and journals are still important in the glass-fibre age. I would suggest a local or regional newsletter that would report on regional activities. There should also be a national periodical which would combine the format of abstracts of HCST research with the open-peer commentary approach of such journals as _Current Anthropology_ and _Behavioural and Brain Sciences_.

As a result of thinking about my own experiences in SAIRA and my experience at various interdisciplinary symposia and meetings I would like to make a few more remarks about lacuna or underemphasized aspects in the Hooker Report.

Perception of Social Processes

Poets, writers and artists have an essential role to play in the perception of social processes. They have not undergone the systematic narrowing of the perceptual field that seems frequently to accompany graduate work and this may partly explain their prompt and direct awareness of social processes. Somehow or other they must become involved in the HCST field in as fully a collaborative mode as the academics. This will involve a certain amount of pain for both groups.

Language

The poets and creative writers have an essential function to play in monitoring the language of HCST workers so that it retains some relationship to the Common Tongue. They must stand between the expert and his jargon and constantly reweave the rough rope of speech and writing that binds us together.

Religion

Skirted by Hooker probably because academics don't know how deal with it, being very often atheistic, agnostic or "progressiv the impact of science and technology on religion is one of the most obvious areas of study. Since it is usually conceded that the general population retains certain religious beliefs and that these in turn influence behaviour and certainly support values, no HCST work can afford to ignore the religious dimension. It is not enough to rely on sociologists of religion or philosophers of religion or even theologians. Serious HCST research must get hold somebody who is actually religious.

Women

I'm not suggesting a chauvinistic tokenism but merely asserting that women often have organizational abilities and perceptual abilities that make their presence essential on HCST projects.

Politics

The SSHRC should not fool itself about the fuss that HCST work will cause and the criticism it is bound to undergo. HCST questions almost immediately involve politics and politicians. If they don't, then the work is "ordinary" research. But if Hooker is correct in saying that humanity itself is at stake then it's probably worth the trouble.

THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY:

A DISCUSSION PAPER

John E. Strawbridge, Ph.D.
Associate Professor,
Department of Psychology,
Memorial University of Newfoundland

Professor Hooker's draft report is truly awe-inspiring in terms of the number of dimensions of the HCST field he has outlined. In the brief time and space available I would like to give additional focus to a few of them.

1. There is a potential danger in a massive re-direction of research funds toward HCST questions. It is assumed that HCST proposals would compete for the same money and involve largely the same personnel currently devoted to disciplinary

research. If HCST efforts were to become trendy, it could siphon research resources from basic reseach. Although undeniably needing re-examination in the 1980's, the idea that society is best served by allowing scientists to follow their curiosity and build their theories has served us well in the past. Excessive tinkering with this system should be undertaken with great circumspection.

2. There is an uneasiness that can be detected, in the draft report and among much of the populace, concerning the use to which HCST knowledge is/will be put. So often, important decisions are left up to politicians who often are not qualified to understand the issues or whose motivations cannot be trusted. The past quarter-century of Newfoundland history is dotted with decisions on major projects made on the basis of the number of construction jobs they generate rather than on the basis of viability, desirability or suitability of the project to the place and people. Politicians call for HCST-type information and then ignore it in the interests of political expediency.

Even the pace of decision-making by governments seems almost anachronistic in terms of the pressures of dealing with evolving technologies and their impact on society and the environment. There is a feeling among many that governments cannot repond quickly enough to prevent or solve problems. Perhaps we need to re-think governing in the light of today's available techological possibilities; e.g. is it necessary for 280 eleced parliamentarians t, be gathered in one place for so

long to get the job done? If not, what difference would it make in the kinds of persons who put themselves forward for election? If re-election were not possible, what difference would it make to the motives of politicians and the quality of decisions made? Would it lessen the extent to which politicians please particular interest groups at the expense of the well-being of the populace?

3. In Part I of the draft report Prof. Hooker says "...at this point in time we are somewhat in the position of discussing goal oriented research without a clear goal having been delineated." Quite so, and for very good reasons. The establishing of explicit, well-defined national goals would be a difficult process in the fragmented sociocultural milieu of our country. Sometimes we can infer goals from the actions of our leaders but in general, there is an absence of debate as to just what goals we wish our leaders to pursue. As citizens, the scientists involved in HCST research ought to be concerned about the legitimacy of the goals they are enticed, through selective research funding, to pursue. Perhaps HCST researchers should be actively involved in deciding on the mechanisms of goal-setting.

4. There is a worry that one often hears expressed when discussing new technologies and the people who use them. The worry is that too often we do things because they can be done without consideration for whether they ought to be done. Nowhere is this concern more prevalent than when educated

people discuss biomedical technologies. For example, in the field of neonatology, extremely premature babies (less than 28 weeks of gestation and/or less than 1000 grams) are being kept alive through the use of complex machinery, drugs and surgery. Too often, it is claimed, the wishes of parents and the long-term effects on the child are disregarded in the headlong rush of neonatologists to do what they can; to exercise skills and employ techniques that are at the forefront of their field. Privately, many of these doctors express a desire for ethical guidance in their work but feel that their training and expertise do not prepare them to make decisions as to whether certain procedures and techniques should be employed.

The issues involved in the decisions regarding when to use particular medical technologies are of the most profound type since they surround the question of what it means to be human as opposed to being merely alive. A few years ago, we witnessed the courts grappling with like questions in deciding at what point life-sustaining machinery could be "unplugged". The technically-oriented but simple-minded answer of a flat EEG response for a particular time duration was a source of profound distress for many. Surely this area is ripe for an intensifying and facilitating of HCST research.

5. The last point I wish to raise concerns the methods used by HCST researchers. There is a story which I have heard twice now but have not attempted to verify. I shall repeat it here for heuristic reasons only. When the harbour at Port-Aux-Basques, Newfoundland was being improved, a team of engineers

came to make measurements of tides, currents, winds, etc. in preparation for building a breakwater. An old fisherman engaged one of the engineers in conversation about the placement of the breakwater. When he heard where the engineers had decided to place the breakwater, the fisherman told the engineer that if it was put in that partiular spot they would never get a big ferry into the harbour in a "nor'easter". The engineer scoffed at the fisherman's advice, relying instead on the objective measurements. I had occasion to think of this story when I sat for five hours on a pitching CN ferry which could not get into the harbour because of a strong northeasterly wind.

The SSHRC, in contemplating the funding of HCST research, is in a peculiar position vis-a-vis the NSERC. That is, NSERC funds scientific and engineering research most of which must adhere to strictly objective research methods. On the other hand, SSHRC funds research which employs a variety of methods ranging along the continuum from objective to subjective. If HCST research, which is almost by definition interdisciplinary in nature, is conducted to evaluate the desirability of a particular technological innovation produced through (or as a by-product of) NSERC-sponsored research, and if the HCST research is perceived to be founded - even in part - on subjective or "soft" methodology, then there could be a problem in credibility that could influence the quality of decisions based in part on HCST knowledge. Note that I have emphasized the word "perceived" because even though a particular member of an interdisciplinary team might be using

the method most appropriate to the question being asked, the bias engendered in the educated public favours information gathered using "hard" (e.g., instrumented) as opposed to "soft" (e.g., interview) methodologies. The long-range solution is to promote more wide-spread science and philosophy of science education.

A LEGAL PERSPECTIVE

Social Sciences and Humanities Research Council of Canada

Workshop on Technology and Society

Leon E. Trakman
Dalhousie Law School
April 1980

INTRODUCTION:

This commentary has the following purposes: firstly, to reflect upon the legal implications arising from the abovementioned report; secondly, to evaluate how this report affects the role of the Council in respect to legal matters; and thirdly, to propose means whereby legal innovations might best be accomplished through the offices of the Council.

The commentary below is limited to a discussion of the relationship between the legal system and the behavicural sciences (per diagram; Report, page 18). Little emphasis is given to the application of the Report to physical sciences; for the legal system generally has only an indirect relationship to physical sciences except in such arenas as law and technology, copy and patent right.

NEED FOR SOCIO-LEGAL STUDY:

In conventional society, increasing suspicion is lodged against formalism in law. There is disdain for a legal system which operates above man, and which is superimposed upon him by legal mandate. There is a hostility towards a legal system which changes, but is unchanged by, man. In truth, Canadian law is an ever changing, not a hard and fast body of legal rules. The principles of our legal system are the reflection of our indigenous social convention, our Canadian business mores, and our family life. Our law is the product of Canadian needs and interests, the instrumentality of our own society. Our law adapts to the changing order of our family life, to variations in our

political values, to alterations in our economic and cultural propensities. Accordingly, legal institutions and social conventions should ideally be construed in the context of Canada itself, not in terms of borrowed systems of law, nor as a reflection of foreign legal rules, nor in recognition of alien needs and distant interests. Canadian law should embody Canadian socio-cultural mores by reflecting upon our indigeneous Canadian politico-economic environment.

It is proposed, therefore, that Council's concerns in legal matters lie within the realm of socio-legal study. Studies are needed into Canadian legal history, into Canadian legal institutions and into Canadian social and business affairs. Our own political institutions warrant careful analysis. Our econo-legal structuring requires constant interdisciplinary synthesis. Our legal system demands repeated development both in form and in substance. Legal rules should only be borrowed from foreign environments where they are capable of adaption to indigeneous demands. Copied legislation and foreign legal precedents are valuable only insofar as they are subject to careful scrutiny within the Canadian context, only after they are deliberately preened in structure, only after they are varied in content in response to localized concerns.

BEHAVIOURAL STUDY:

The development of Canadian law depends largely upon the ability of our legal system to weigh together governmental and private interests. The efficiency of Canadian law hinges upon the

capacity of the legal system to contrast together community and individual interests, private and public rights, in the interests of ordered yet just Canadian laws. Consequently, a central concern of the Council should surely lie in funding interdisciplinary legal study, in assisting to foster Canadian socio-legal awareness in specific subject areas and in promoting indigeneous legal development in both Canadian public and private law areas.

A STUDY OF SOCIO-LEGAL INSTITUTIONS:

Research into Canadian legal institutions necessarily requires an analysis of the nature and significance of competing forces that affect legal relationships. These institutions are highlighted as potential study arenas:

i. Increased humanistic study. A willingness to develop behavioural-legal studies along scientific lines. A readiness to employ social science techniques in order to measure behavioural patterns and verify socio-legal observations by scientific means. A propensity to use varied scientific instruments in socio-legal studies, including *inter alia*, mathematics and statistics, ethnographic and demographic study, trend and graphic illustration, questionnaire and interview analysis.

ii. A capacity to assess legal development from these perspectives:

a. The utility of law: the effectiveness of legal principles. The meaningfulness of legal rules. Alternative

means of regulating human behaviour.

b. The substance of law: the content of legal principles. The distinction between inter alia, peremptory and suppletive, codified and judge made law, and between restrictive and liberal constructions of law.

c. Forms of laws: the operation of statutory, judicial and administrative law. The significance of oral and written determinations in law. The use of particular legal forms such as notarial execution, signature and related formalities.

d. Alternatives to legal rules: The avoidance of legal rules. The recourse to socio-cultural and business rules. The utility of family pressure as a tether upon behaviour. The value of social controls and business restraints upon the conduct of private affairs. The combined use of legal and extra-legal controls in socio-business dealings.

iii. Interactions between legal and non-legal institutions: Adapting socio-legal study to prevailing cultural and political convention. Basing legal reform upon interdisciplinary syntheses. Developing rules of law in accordance with social needs. Promoting legal principles which effecutate community interests. Synthesizing utilitarian values, individual and social concerns, with a view to developing purposive legal reform.

INDIGENEOUS STUDIES

Specific socio-legal studies are useful means of enhancing

the effectiveness of prevailing public, and private law institutions in Canada. The following is a breakdown of key public and private law activities, their characteristics and their potential development as socio-legal entities worthy of research.

(i) Public Law Institutions:

General aspirations include: (a) Developing a synthesis of legislative, executive and judicial processes in Canadian law. (b) Evaluating their nature, functions and effective operation, (c) Scrutinizing their deficiencies, (d) Fostering potential innovation to improve upon their efficiency.

Specific public law studies encompass : (a) Investigations into the constitutional structure of Canadian government; (b) Examinations of the administrative tribunals that govern Canadian government and Canadian citizens; (c) Analyses of controversial Federal and Provincial boards and commissions that function under executive direction; (d) Syntheses of the interaction between branches of government, their interrelationships and mutual interdependance.

(ii) Criminal Institutions:

A need to enhance the criminal process in Canada. Evaluating the nature, significance and effect of criminal law in our society. Identifying the deficiencies of the criminal justice system. Promoting desireable reform in the criminal justice system.

General studies encompass (a) Identifying the causes of "criminal" behaviour, (b) Analyzing the effect of such behaviour

upon individuals and upon society at large, (c) Appreciating the interrelationship between the causes and the effects of deviant behaviour in Canadian society, (d) Comparing the different ways of regulating criminal behaviour through legal and non-legal means, (e) Establishing the appropriate limits of rules of law as effective regulators of deviant behaviour.

Specific criminal law studies include: (a) Investigations of crimes against life, incorporating inter alia: abortion, euthenasia and infanticide, (b) Analyses of crimes in respect of property, including: theft, fraud, extortion, (c) Investigations of crimes against the common good, encompassing treason, deregation of public duties, and related offences.

(iii) Private Law Institutions:

Studies into the relationship between private citizen and citizen, between individual and individual. This includes an anlysis of the institutions, structures and operation of family law, property law, contract law and business law, their functioning, their interdependance, and their effectiveness as tethers upon individual behaviour.

Specific private law studies include: (a) Analyses of legal relationships between and among families, (b) Investigations of socio-cultural and legal institutions that affect marriage and divorce, guardianship and custody, child care and child abuse, (c) Syntheses of business practices and laws that regulate business practice, (d) Comparisons between the operation of business and legal institutions, (e) Investigations into consumer and

nonconsumer, commercial and noncommercial transactions, (f) Analyses of the laws that affect landlord and tenant, insurance and credit, bailment and carriage, patent and copyright and related business transactions.

CONCLUSION

The direction of Canadian law must surely lie in the experience of people, in human communication, in social interaction, in community values. This short paper has purported to translate concerns expressed in the Report into a legal framework. The study highlights the search for a living Common Law in Canada. The analyses identifies research areas in which legal growth is tardy. The investigation proposes legal study into identifiable spheres of human endeavour. Ultimately, financing research in law, like the conduct of research itself, must respond to socio-legal demands. Ultimately, Canadial law is only as sound as are the creators of Canadian law, the innovators and the reformers who monitor social advance and who translate social policy into legal progress.

The Human Context in Science & Technology
Some Comments

W. J. Woodfine
Professor of Economics
St. Francis Xavier University

One of our first problems in the whole area of HCST is to determine the extent to which the problems raised for human values are significantly different than those that occurred at other points in time when there appeared to be sudden and major changes in the science and technological environment. In other words, is our concern for the problem now merely a linear progression of what has often been a belated awareness that "all's not right with the world?" Or, alternatively, are we convinced that today's problems of HCST are fundamentally different; that now we are talking about a difference in kind and not degree only?

I think that the latter is the real situation and, in my view, there are two separate factors that may explain why the current and future situation is fundamentally different from the past. First, in the area of communication, it can now be said that information (propoganda, education, entertainment, economic, etc.) can now be transferred nationally and internationally at virtually the speed of light. One of the implications of this particular technological revolution is that for individuals, corporations, governments, there is now substantially less time for "meditation" before the need for reaction. To the extent that we are inclined more and more to suffer from national paranoia or indeed any other form of instability, then

the more likely will our reactions be arbitrary and irrational. This situation is bound to increase instability and tension.

The second "fact of life" that makes our current situation fundamentally different than earlier times is the nuclear fact whether manifested in the nuclear bomb and the world of weaponry, arms race, etc. but also the so-called peaceful uses of nuclear energy: the problems of waste material storage and the fact that nuclear accidents can now have genetic effects not only for those directly associated with nuclear technology but also for third parties who are totally unassociated with such activity. This makes the use of probability studies of, for example, coal vs nuclear energy and the number of expected fatalities, injuries, illness, etc. not entirely reliable.

In one sense, the Workshop is being asked to consider whether it is worthwhile to discuss the notion that we must recognize the need for a new field of study - the Human Context in Society and Technology. This is largely a recognition of the fact that problems <u>for humans qua humans</u> are being created by developments in science and technology and, for a variety of reasons, there is a growing awareness that we society is not dealing with these problems. Without going into the details of Hooker's paper and somewhat uncertain in my own mind as to the organizer's expectations from each of us, I find that the best and simplest way to describe our concerns is that society may well be in a situation of "Malthusian dilemmas." I accept this description without necessarily supporting the details of any particular doomsday model such as the Meadows model. The world described by the original Malthus was, of course, completely different than ours in a variety of ways. Indeed, many would argue that it was science and technology that

"saved" the world of Malthus. Now, in a sense, we're suggesting that science and technology are creating a Malthusian world.

The notion of a Malthusian world could be misleading. The fact of diminishing returns and the failure of production to grow at a rate that approximates the rate of population growth is basically a problem that arises from the relationship between physical variables. In earlier centuries, most of the people in most of the countries were badly off as measured by any set of social indicators. The situation now is quite different both nationally and internationally. More than ever before, the fact and extent of inequality is what stands out. The Decade of Development (the 'sixties) did not help to close the gap between the living standards of those in poor countries compared to those in rich countries. As we all know, the gap between rich and poor has increased steadily. In Canada, there has been little change in the distribution of family income. What is particularly discouraging is that the total package of welfare programs, the pattern of tax and expenditure programs by all levels of government is generally judged to be regressive in terms of its overall impact on society.

The relationship between these comments and the HCST may seem tenuous and strained but there is a relationship. The new Malthusian dilemma as described by Hooker is characterized by a rapid depletion of resources that is caused by high rates of consumption. Even resources of marginal quality are being consumed and this has been made possible by advances in science and technology. In this sense, of course, advances in S & T are continuing to postpone the ultimate

doomsday as postulated in a Malthusian model. The main point here, however, is that S & T advances may be viewd as something that contributes in a substantial way to inequality because its benefits are not shared and there does not appear to be any compulsion, moral or otherwise, to attempt to produce a different outcome.

What is particularly disturbing about much of our social malaise is the strong move towards conservatism, even isolation, that has been developing over the last several years. In some ways, it almost seems as if government itself has given up in its attempts to achieve a better society. In my view, there appears to be an attitude on the part of policy makers that "well, we tried; it didn't work; the hell with it." In economics, this philosophy is evident in some of the new jargon: "the natural rate of inflation"; "the natural rate of unemployment", etc. It's hardly surprising that these phrases originate with Milton Friedman and the so-called monetarist, market-oriented, economic philosophy. In Canada, we see this trend exemplified in such statements as "there must be more reliance on the private sector", "less government involvement", etc., etc.

In many ways, in Canada, we are no longer that sanguine about our future. We no longer really do believe that the "twentieth century belongs to Canada." Almost suddenly, we are in a world where competition is tough, where the high degree of interdependence that resulted from phenomenal growth in international trade and specialization has made us extremely vulnerable to shocks that can emanate almost anywhere. We have seen our standard of living fall from second in the world to fourth or fifth; our regional disparities persist. This has all

occurred while science and technology have marched on, almost willy-nilly, solving some problems but creating others.

The plight of the human context is much of what is happening can perhaps be understood a little better by the amazing popularity of Schumaker's Small is Beautiful. As an economics treatise, the book hardly rates anything at all but as a moral indictment of our social and economic system of which science and technology are part and parcel, the book has had a tremendous impact. For Schumaker, the human context has become a victim. His solution is more spiritual than economic: "We don't really need all these material possessions." Lester Thurow in his new book The Zero-Sum Society writes that "Our economic problems are solvable . . . But all the solutions have the characteristic that someone must suffer large economic losses. No one wants to volunteer for this role, and we have a political process that is incapable of forcing anyone to shoulder this burden . . . It is not we versus them but us versus us in a zero-sum game."

Is this attitude true beyond strictly economic behavior? Is there an unwillingness to accept sacrifice, to be concerned about the human context, to place restraints on ourselves and ultimately to be hopeful about controlling the forces of science and technology? Is our failure to achieve much in these areas really the basis of what Christopher Lasch calls The Culture of Narcissism? And, if any of this is plausible, then are we not in the area of ethics and philosophy where we must be able to say something definitive about human values and, perhaps, the value of humans.

ONTARIO REGION REPORT

BACKGROUND PAPERS

ISSUES IN TECHNOLOGY AND PUBLIC POLICY

Douglas Torgerson
Faculty of Environmental Studies
York University

prepared for the meeting of the

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In the following notes, I try to identify some general issues around which research efforts could be oriented. The various issues discussed here are clearly not unrelated. However, I have made no attempt at this point to develop a coherent framework within which research on the various issues could be systematically linked. My focus here is on issues relating to technology and public policy which I see as being somehow basic. Basic issues in public policy, of course, involve us in questions of political philosophy.

1. Technical Form and Socio-Political Form

Two diametrically opposed notions compete in our understanding of the relationship of "technology" to social and political life. On the one hand, "technology" is seen as somehow virtually neutral. On the other hand, "technology" is--in contrast--seen as an irresistable juggernaut determining virtually the whole of social and political relationships. Fortunately, some recent work has progressed beyond these two crude images. But this matter needs to be explored

further, both theoretically and empirically. I would suggest that the issue be framed in the following manner: What is the relationship of technical form (including the design of both specific technologies and infrastructure) with socio-political form? Work could proceed along two different routes: (1) Attention could be given to technologies in specific fields--e.g., energy, transportation, housing, communication. (2) The focus could be placed on proposals to advance technological research and development in Canada (e.g., those of the Science Council) in order to promote industrial innovation. Attention could be devoted here to the question of the sort of social and political impacts one could expect in the long term from different R & D policies. Particular consideration could be given to different patterns of regional development which could be encouraged or inhibited by different types of policies.

The work of Langdon Winner is worthy of particular note: see his "Do Artifacts Have Politics?", Daedalus, 109:1 (Winter 1980): Modern Technology: Problem or Opportunity? Also see William Leiss, "False Imperatives of Technology" in David Shugarman, ed., Thinking About Change, Toronto: University of Toronto Press, 1974. On energy, see David W. Orr, "U.S. Energy Policy and the Political Economy of Participation", Journal of Politics, 41:4 (November 1979). On communication, see Joseph Weizenbaum, Computer Power and Human Reason: From Judgment to Calculation, San Francisco: W.H. Freeman, 1976.

2. Ethics and "Social Technology"

It has been suggested that "ethics" is progressively eclipsed as a category of life in advanced industrial society--a tendency which, it is argued, is especially evident in what has been called "social technology". Evidence for this view is readily at hand, for example, in the common sense view that "ethics" and "economics" are somehow radically distinct--a view which Adam Smith, as a Professor of Moral Philosophy, would undoubtedly have found strange. Smith, of course, was also a "social technologist" of sorts--as were many of his Enlightenment colleagues. Work is needed in intellectual history and the sociology of knowledge which will help to illuminate the origin and development of the relationship between ethics and social technology.

See Jürgen Habermas, "Science and Technology as 'Ideology'" in _Toward a Rational Society_, trans. Jeremy J. Shapiro, Boston: Beacon Press, 1971. Cf. Karl Polanyi, _The Great Transformation: The Political and Economic Origins of Our Time_, Boston: Beacon Press, 1957; Peter Gay, _The Enlightenment: An Interpretation_, Vol. II, New York: Alfred A. Knopf, 1969, ch. 7; Sir Alexander Gray, "Adam Smith", _Scottish Journal of Political Economy_, XXIII:2 (June 1976).

3. Reason and Human Values

The dispute between "cognitivist" and "non-cognitivist"

ethics appears to be taking some interesting turns--which appear to me to suggest the possibility of a revival of some type of cognitivist ethics. If this is so, "reason" might again be regarded not only as deductive and instrumental--as a calculative technique for the achievement of ends--but also as a determinant of ends: indeed, as a potential guide for public policy. This is a crucial issue. A systematic, critical survey of the history and current status of the debate could be an important contribution. (Such work could aid, for example, in the consideration of issues such as the following: Some have argued in favour of greatly increased public participation in decision-making for the reason that, while "technical" issues can be left to experts, "value" questions cannot. Can this view withstand critical scrutiny? What are the implications for public participation if it cannot? Would some reformulation be viable? These questions perhaps suggest some complexities of the issues involved here.)

Cf., e.g. Charles Taylor, "Neutrality and Political Science" in Alan Ryan, ed., The Philosophy of Social Explanation, Oxford: Oxford University Press, 1973; Jürgen Habermas, "Dogmatism, Reason and Decision: On Theory and Practice in Our Scientific Civilization" in Theory and Practice, trans. John Viertel, Boston: Beacon Press, 1974; A.D. Nelson, "Ethical Relativism and the Study of Political Values", Canadian Journal of Political Science, XI:1 (March 1978).

4. Cultural and Historical Perspectives on the Future

Endeavors such as "technological forecasting" employ a diverse range of well-known techniques. At least one of these takes its name from a mode of "forecasting" which was quite different from the contemporary approach--the ancient oracle at Delphi. I would suspect that few people familiar with today's Delphi technique have anything but the vaguest notion of what was involved in the original oracle. I believe that it would be quite fascinating to have a comparative study--cutting across cultures both historically and contemporaneously--which would survey the ways in which other human societies have attempted to grasp the future. In such a study, our current approaches to forecasting should be treated as simply one case, not as an exemplary model. Such a study could, indeed, be more than fascinating. It could also be an important step in coming to terms, rationally, with the significance of human intuition. (Cf. 5 below.)

On the original Delphi and its significance, see Rollo May, The Courage to Create, New York: Bantam, 1978, ch. 5, esp. pp. 126-127: "Whatever the intention of Delphic priests, the effect of ambiguous prophecies was to force the supplicants to think out their situation anew, to reconsider their plans, to conceive of new possibilities. . . . The counsels of Delphi were not advice in the strict sense, but rather were stimulants to the individual and to the group to look inward, to consult their own intuition and wisdom. The oracles put the problem in a new context so that it could be seen in a different way, a way in which new and as yet unimagined possibilities could become evident." Cf. Solomon Encel et al., eds., The Art of Anticipation: Values and Methods in Forecasting, London: Martin Robertson, 1975.

5. The Education of Guesswork

Towards the end of The Report of the Mackenzie Valley Pipeline Inquiry, Mr. Justice Thomas Berger offers the following view:

> If you are going to assess impact properly, you have to weigh a whole series of matters, some tangible, some intangible. But in the end, no matter how many experts there may be, no matter how many pages of computer printouts may have been assembled, there is the ineluctable necessity of bringing human judgment to bear on the main issues. Indeed, when the main issues cut across a range of questions, spanning the physical and social sciences, the only way to come to grips with it and to resolve it is by the exercise of human judgment.

Similarly, it has been argued that the crucial issues of an industrial society involve us in problems of "hypotheticality", or questions which are necessarily "trans-scientific". If we are to take these views seriously and if we are to face our situation rationally and realistically, we must look beyond "calculation" and allow a central role for the "art of judgment". We must, futhermore, admit that this "art" amounts, in the end, to what we sometimes call "educated guesswork". But what is involved in the notion of educated guesswork? Are some forms of guesswork more reliable than others? Would it, indeed, be possible systematically to educate guesswork? These issues call for serious consideration. As a more practical

orientation is urged for education, research on this question could have considerable significance.

Consideration might also be given to the social and, particularly, the organizational context of guesswork. I have in mind, for example, Herbert Simon's thesis that complex organizations operate according to "a drastically simplified model" of "the real world", "a gross simplification" in which it appears that "the real world is mostly empty" and that "most significant chains of causes and consequences are short and simple." An issue which ought to be investigated is the extent to which this kind of organization systematically promotes a _miseducation of guesswork_.

See Mr. Justice Thomas Berger, _Northern Frontier, Northern Homeland: The Report of the Mackenzie Valley Pipeline Inquiry_, 2 Vols., Ottawa: Supply and Services Canada, 1977 (quotation, Vol. II, p. 229). Cf. Alvin M. Weinberg, "Science and Trans-Science", _Minerva_ X:2 (April 1972); Wolf Häfele, "Hypotheticality and the New Challenges: The Pathfinder Role of Nuclear Power", _Minerva_ XII:3 (July 1974). Also see Sir Geoffrey Vickers, _The Art of Judgment: A Study of Policy Making_, London: Chapman and Hall, 1965. A number of articles relevant to education issues generally are collected in W. Roy Niblett, ed., _The Sciences, the Humanities, and the Technological Threat_, London: The University of London Press, 1965. For the quotation from Herbert Simon, see his _Administrative Behavior: A Study of Decision-Making Processes in Administrative Organization_, New York: The Free Press, 3rd ed., 1976, pp. xxix-xxx.

6. The Assessment of Technical Information

As Majone has indicated, we are frequently faced with the need to assess "incomplete and often contradictory information." The experts disagree, and the experts, moreover, are not part of an ideal, rational world: they are affected, as is everyone else in the policy process, by a communicative context of strategic interaction. Is there any way to resolve this problem, or to alleviate it, in a way which will promote a more rational process? Majone advocates--as have others--an adversary approach following the model of a "generalized jurisprudence". The assessment of technical information is, then, to be undertaken not in terms strictly of "technical criteria", but also on the grounds of legal reasoning: juris-prudence. Judgments made in a legal setting appeal to common sense and precedent--in other words to traditions of human interaction in contrast with formalized, instrumental logic (cf. Habermas). In a legal setting, attention is given to process issues contained, for example, in principles of "natural justice". Applied to problems of assessing technical information, such attention to process would raise the question of the role of public participation and the significance of the interaction between expert and non-expert. The strength and limitations of Majone's proposal should be seriously explored.

See Giandomenico Majone, "Technology Assessment and Policy Analysis", Policy Sciences, 8:2 (June 1977), pp. 173-174. Cf. Allan Mazur, "Science Courts", Minerva, XV:1 (Spring 1977); Duncan MacRae, Jr., "Technical Communities and Political Choice", Minerva, XIV:2 (1976-77), N.B. n. 25; Henry M. Hart, Jr., and John T. McNaughton, "Evidence and Inference in the Law", Daedalus, 87:4 (Fall 1958); Arthur L. Corbin, "The Interpretation of Words and the Parole Evidence Rule", Cornell Law Quarterly, 50 (1965): 161-190; Walter Benn Michaels, "Against Formalism: Chickens and Rocks" in Leonard Michaels and Christopher Ricks, eds., The State of the Language, Berkeley: University of California Press, 1980. Also note Dorothy Nelkin and Michael Pollak, "The Politics of Participation and the Nuclear Power Debate in Sweden, the Netherlands, and Austria", Public Policy, 25:3 (Summer 1977); Helmut Hirst and Helga Nowotny, "Information and Opposition in Austrian Nuclear Power Policy", Minerva, XV:1 (1977).

7. The "Human Factor" in Technological Design

Events in the nuclear power industry have brought to attention the fact that "technical systems" must be understood as comprising the interaction of physical and human elements: man as well as machine. The "risk" issue in nuclear power has highlighted, as well, the great difficulty--perhaps, indeed, the impossibility--of calculating the long-term operation of such highly complex machinery, even when the "human factor" is left out of consideration. I believe that critical attention should be given to current attempts to take the "human factor" into account in such tenuous calculations. Of course, these matters go well beyond the nuclear power issue. Human fallibility --and, indeed, malice--may well be intractable problems in the

case of machinery which must be designed and operated by human beings, but which _must not_ fail. An abiding awareness of human fallibility could, perhaps, help to avoid the mistake in development and design decisions of relying overmuch on human perfection.

Cf. Arthur Porter, _A Race Against Time: Interim Report on Nuclear Power in Ontario_, Toronto: Royal Commission on Electric Power Planning, 1978, ch. 6, esp. pp. 80-82.

8. World Views and Technological Development

The question of the relationship between world views and technological development might be considered an aspect of the broader question of the relationship between technical form and socio-political form (see 1 above). Nonetheless, I believe that this is an aspect which deserves special attention. It has been argued that the prevailing pattern of technological development is entwined with an "ideology of industrialization". Technical innovation is significantly affected by background assumptions and interests relating to the prevailing images of man, social reality, human reason, progress, and the good society. The pattern of technological development, in turn, acts back on these images--perhaps reinforcing them, perhaps re-forming or challenging them. These relationships need to be investigated in a systematic manner. The emergence of the vision of an

"alternative" pattern of technological development could be a central focus for such a study: what "alternative" world view is associated with it and what might the significance of it be for popular images of science and technology? Background assumptions and interests need to be examined if technological development is to proceed in a more rational fashion.

Cf. William Leiss, The Domination of Nature, Boston: Beacon Press, 1974; David Dickson, Alternative Technology and the Politics of Technical Change, Glasgow: Fontana/Collins, 1974; Langdon Winner, Autonomous Technology: Technics-out-of-Control as a Theme in Political Thought, Cambridge, Mass.: The MIT Press, 1977.

Ted Schrecker, April 1980

THE POLITICS OF SCIENCE, TECHNOLOGY AND ENERGY POLICY

It is tremendously hard to set manageable limits for considering the issues raised by the relationship of science, technology, and energy policy. Arguing that energy policy represents a collection of decisions about (at least in the first instance) the development, deployment and desirability of technologies, one could simply equate this discussion with any discussion about energy policy. I have tried to outline a selection of issues a bit more restricted than that, without pretense of being either comprehensive or thoroughly systematic. Indeed, systematic classification of the issues raised by energy policy would itself be a major project in political theory, and one very much worth undertaking.

A tentative and analytically convenient beginning might be the classification of research in, and exploration of, Canadian energy policy as being either predominantly substantive or predominantly structural. An example of the first category would be criticism of Canadian energy policy for paying excessive attention to primary energy supply while ignoring demand as a significant policy-determined variable, or constructing projections of future energy demand and supply mixes assuming a certain level of technical improvement in efficiency of energy use. An instance of the second might be Murray Randall's attempt to link the outputs of energy policy planning to consideration of the nature of rationality, and to the nature and function of the capitalist state.[1]

A number of substantive approaches to Canadian energy policy have, in fact, contained fairly explicit analyses of the kind of institutional change that would be needed to achieve certain objectives. Nevertheless, many such critiques involve an implicit (sometimes explicit) conception of the policy process and of governments as neutral mechanisms or arbiters, responsive (if in a sluggish way) to the weight of superior information or argument. I would strongly dispute the validity of this version of how the political process works. But it is important not to dismiss largely substantive, or output-oriented, approaches to energy policy

even when they manifest this theoretical shortcoming. If only because the limitations of the official wisdom about energy policy are so severe, and the range of possibilities it explores so narrow, such critiques assume a tremendous subversive importance simply because they do illustrate the existence of possibilities outside the range of official forecasts!

Hard and Soft Energy Paths

The central substantive debate in energy policy can safely be said to be that of hard vs. soft energy paths. The terminology was coined by Amory Lovins in a 1976 article in Foreign Affairs, and the structure and content of the debate extensively elaborated in a two-volume set of Congressional Committee proceedings.[2] Lovins has characterized the prevailing wisdom in energy planning, in Canada, the United States, and elsewhere, thus:

> Until a year or two ago, there was a strong industry-government consensus, remnants of which still linger here and there, that the energy future should be like the past only more so and that the energy problem is simply how to expand domestic energy supplies to meet extrapolated demands. The demands, however, were treated as homogeneous aggregated numbers; we will need so many quads of total energy in the year X, without looking particularly at the structure of those demands.[3]

That basic failure, closely interrelated with the assumption of continually increasing demand for primary energy (itself the product of a number of questionable premises) has led the Department of Energy, Mines and Resources to conclude that meeting Canada's energy needs in the year 2000, even on the basis of a projected annual growth in energy demand which has been repeatedly reduced in recent years, will require:

- over 8000 new producing oil wells;
- 12 Syncrude-sized oil sands or heavy oil plants;
- over 4000 new gas wells;
- 14 new coal mines;
- 21 new hydro plants of size of James Bay LG-1;
- 11-15 new nuclear plants of the size of Bruce "A" (3200 MW capacity) and related mine production;
- renewable energy equivalent of 6 Bruce "A" stations;
- infrastructure additions--pipelines, transmission lines, etc.[4]

I cannot here develop a comparison of hard vs. soft energy paths, except to note that the policy just stated epitomizes the hard path, while what Lovins and others have called the soft energy path emphasizes (in different proportions depending on the case involved) smallness of scale, matching quality of energy and scale of production to end-use, improving the thermodynamic efficiency of energy systems, and reassessing at least some needs for energy and for the services it provides. It is worth noting a few of the central issues in the debate.

One involves fairly straightforward technological assumptions: what technologies are available, or are likely to be available, and what they will do. (This is not always as straightforward an issue as it seems: for instance, what a solar collector system for space heating "will do" depends to a considerable degree on whether it's installed on a well- or poorly-insulated house.) A related issue is that of the appropriate method of comparing costs; a frequent criticism of hard energy advocates is that they compare costs of new supply investment (e.g. solar heating) with averaged costs of old and new supply (e.g. comparisons with current or projected oil prices, rather than costs of new oil supply) to "prove" the soft path uneconomical. Too, improvements in efficiency of energy end-uses are often not considered as a supply investment in such economic or technological evaluations.[5]

Another issue is that of the relationship between energy demand and economic growth. A great deal of work has been devoted to examining the degree to which energy growth and economic growth can be "decoupled"--that is, to which GNP can continue to grow without commensurate growth in energy demand. A certain set of assumptions about this issue is implicit or explicit in almost all energy demand projections. Less often examined is the further set of assumptions about the relationship between continued GNP growth and real well-being. (This issue brings us to an important structural question: the extent to which, as Miliband has pointed out, the acceptance of GNP growth as a universal desideratum on the assumption that it does lead to increased well-being for all is crucial to the state's function in a capitalist society of planning "the economy".[6]) Even a brief review of the technical literature

around these issues would take many times the space available here.

The development of substantive critiques of Canadian energy planning based on radically different conclusions about the content of these sets of assumptions is a relatively recent phenomenon.[7] The surprising aspect of the debate, in fact, is that it has attained such a high level of technical sophistication in the relatively few years since it became recognizable as a debate. Much more detail, richness, and diversity of approach is still available from south of the border. The _reasons_ for this relative paucity of alternative approaches, even on a purely technical level, has much to do with the politics of energy policy and the allocation of resources for research, development and publication. (See below.)

It may well be that the debate between advocates of hard and soft energy paths is "in fact" a contest between two distinct (and, according to Lovins, incompatible) world views. John Robinson can elaborate this argument far more capably than I. I think it is important to make the point, however, that this aspect of the debate in no way reduces the need for sound and consistent scientific and technical information. If anything, the argument that fundamentally-inconsistent world views are involved is an argument _for_ soundness of information, for well- as opposed to ill-informed choices.

Political Issues I

The perspective on energy planning outlined by Lovins (p. 2, above) has had major effects in terms of the supply strategies adopted. Lovins has argued, for instance, that the increased reliance on nuclear energy is a direct result of the way hard energy paths are developed: Given a figure for energy demand in the year _y_ of _x_:

> . . .(which is traditionally obtained by subtracting a modest "conservation percentage" from the result of applying a straight-edge to semilogarithmic graph paper), one can estimate domestic and hoped-for imported supplies of fossil fuels at _y_, account for any domestic hydro or geothermal power, assume other renewables are negligible until well past _y_, derive a "gap", and label it "nuclear".[8]

The "need" for a number of large-scale energy commitments (nuclear electric generation, northern pipelines, offshore drilling in the far North) has generated a number of political issues revolving

around the definition and evaluation of risks from the projects, and around the distribution of benefits. Proponents of nuclear electricity have promoted one particular definition of risk (Risk = Probability X Consequences) which is clearly not the only one, but does have the tactical advantage of allowing proponents of the technology to argue that any level of consequences can be made acceptable by calculating a sufficiently small probability.[9] The Berger inquiry and subsequent debates have clarified the issues around risk/benefit distribution of northern development, and a great deal of scientific material is available on possible ecological disruptions, but it is not clear that the policy process has been significantly altered by this enlightenment. A second-order range of issues involves questions like: how does one discount radiation damage to future generations? What is the opportunity cost appropriately attached to a damaged Arctic ecosystem? Appropriately according to whom?

These questions are raised at some length because the "answers" involve the availability of alternative ways of accomplishing the same objective, or a tolerably similar one. The importance one attaches to proceeding with northern oil exploration, or with nuclear expansion, may very well depend on the availability of information about alternatives--*i.e.* is the alternative freezing in the dark, or a home insulation program, or paying a cost premium for synthetic fuels from biomass? This is not meant to reduce the question to a technical or managerial one, but to highlight the political importance of control over technological information and technological development.

A basic issue in the politics of energy is the control of, and sometimes systematic manipulation of, scientific and technical information by proponents of a particular policy. One obvious example is the way projections of natural gas reserves and demand throughout the mid- and late-1970s conveniently lent support to whatever pipeline proposal was being promoted at the moment. The private sector near-monopoly of information on reserves and producibility has been acknowledged by policy-makers for some years.[10] Not only the information content, but the structure of policy debates over nuclear electricity (for

instance, the omnipresent coal-fired-vs.-nuclear electricity comparisons of cost or environmental impact) have been largely determined by proponents of the nuclear option, despite the presence of a supposedly-independent regulatory body.[11] Even if one wants to continue viewing the policy process as a "black box", a systematic critique of the manipulation and control of scientific information is valuable. To what resources (financing, staff paid by the public or written off against income, ex-directors in senior bureaucratic posts) do proponents of particular policies have access? What options are foreclosed by the structure of the "information" provided?

Systematic study of the major industries in the energy policy field has been spotty. Much work has been done on the oil and gas industries, and even on their manipulation of the regulatory process in their own interests. Less has been done on, for instance, the coal industry, and almost nothing on the private sector component of the nuclear electric industry in Canada. Conversely, a sympathetic but critical sociology of the anti-nuclear "movement" in Canada, or of the proponents of low energy growth and efficient end-uses, would be an interesting project. Interesting, too, would be a comparison of the resources available to these actors with those of the private sector energy industry (and of public enterprises like Ontario Hydro).

Another project which has been undertaken in the United States, though not here, is the cumulative quantification of public subsidies (tax concessions, land grants, depletion allowances, research funding, etc.) to various energy supply sources.[12] We know about some "hidden subsidies" like the super-depletion allowance; others, like differential tax treatment for energy purchases and on-site supply investment, are less well understood.

Political Issues II

Two more general areas of analysis appear to me to be particularly important. The first, drawing on literature from various areas of political science, would attempt to evaluate the constraints on energy policy imposed by our conception of politics and the policy process. It is often argued, as noted earlier, that the choice between hard and soft energy paths is a choice between

coherent sets of relatively long-term objectives. But is it the nature of our political system to facilitate such choices, or even to make them possible? Perhaps "muddling through" as a preferred mode of policy-making carries within it drastic limitations on the kind of energy policy Canada can have. The crucial decisions--or, rather, "non-decisions"--may be built into our models of the policy process.[13] (This can be seen either as an argument against explicit long-term energy objectives, or as an argument against muddling-through. This, itself, is a worthwhile question.)

Another avenue of approach is suggested by Edelman's treatment of "politics as symbolic action".[14] The tendency to substitute highly visible, symbolic responses to crises for more effective alterations of the allocation of resources--and, indeed, to orchestrate or structure crises into appropriate symbolic form for "the leader's dramaturgical jousts with public problems"--may mean that some kinds of energy policies will require basic changes in our political universe. For instance, large, symbolically-intense projects like James Bay may win out every time over revised building codes. Are many of the limitations of current energy policy rooted in the dynamics of our political culture?

Second, the development of what might be termed a radical policy analysis is urgently needed. One possible approach is that of Hooker and van Hulst, who have linked the structure of institutions which implement energy policy both to more basic social and economic factors and to the content of the policy itself.[15] Certain kinds of institutions, generated by certain historic exigencies, will inevitably produce certain policy perspectives. Another important direction has been suggested by Rianne Mahon, who appears to have developed a specifically Marxist-oriented policy analysis in work on the development of Canadian economic policy.[16] The absence of a comparable inquiry into the bureaucracies which make energy policy on the federal level points up how little is known about that bureaucracy; more work has been done on policy development in specific provinces[17] or around particular issues like northern pipelines.[18] There is great scope for what might broadly be termed a political economy of energy policy

in Canada, especially if the scholastic class analyses characteristic of much of the Canadian academic, nationalist left can be abandoned, or at least refined--as Mahon has done--to make more explicit the links between class structure and the political process.

A personal note: my concern with energy policy is as much an activist as an academic one. I therefore conclude with a plea that highly theoretical projects, however important, not be pursued to the exclusion of specific substantive exercises ("scenario-building") or examinations of what kind of institutional change would be necessary for certain kinds of energy policy. It is only recently that the debate, such as it is, over energy policy has begun to lose the one-dimensionality (Marcuse's term is used advisedly) which characterizes so many other policy areas in Canada. The creation of new dimensions is aided just as much by the articulation of concrete and coherent alternatives for the future as by refinements of our theoretical and empirical understanding of how energy policy is developed. That constant tension between the two directions is one of the exciting things about studying, and seeking to influence, energy policy.

Ted Schrecker is a Research Associate with the Ontario New Democratic Party Caucus and former editor of Alternatives: Perspectives on Society and Environment. He is completing (someday!) a thesis in political science at York University on the political economy of energy policy in Canada.

Notes

1. Murray Randall, "Energy Policy Planning: Towards a Critical Perspective," Alternatives 7(1), 1977.
2. "Energy Strategy: The Road Not Taken," Foreign Affairs, October 1976; Alternative Long-Range Energy Strategies, 2 vols. (Washington, D.C.: U.S. Government Printing Office, 1977).
3. Lovins, "On Soft Paths Versus Hard Paths", Alternatives 8 (3/4), 1979.
4. C. H. Smith, "Energy Needs in Canada to Year 2000," in Energy and Environment: Needs and Constraints, Proceedings of a Symposium sponsored by the Ontario Research Foundation, November, 1978. For background on how this demand and supply picture was developed, see J. E. Gander and F. W. Belaire, Energy Futures for Canadians, Report EP 78-1 (Ottawa: Energy, Mines and Resources, 1978). The plural in the title is highly misleading; the report presents only one possible "future"--an instance of bureaucratic control of information leading to a drastic and politically restrictive contraction of the range of possibilities.
5. Just two illustrations of how this concept of efficiency as a supply investment can work: Marc H. Ross and Robert H. Williams, "Energy Efficiency: Our Most Underrated Energy Resource," Bulletin of the Atomic Scientists, November 1976; Demand and Conservation Panel of the Committee on Nuclear and Alternative Energy Systems, "U.S. Energy Demand: Some Low Energy Futures," Science 200, April 14, 1978.
6. Ralph Miliband, The State in Capitalist Society (London: Quartet, 1969).
7. The most exhaustive work involves a province-by-province set of low-energy-demand scenarios prepared by Friends of the Earth in early 1979 and published in Alternatives 8(3/4), 9(1) and 9(2), 1979 and 1980. Previous major efforts include: John Robinson et al., Canadian Energy Futures (Toronto: York University Workgroup on Canadian Energy Policy, 1977); David Brooks et al., "Some Scenarios of Energy Demand in Canada in the Year 2025" (Ottawa: Energy, Mines and Resources, mimeo, 1977); David Brooks, Zero Energy Growth for Canada: Necessity and Opportunity Report R-8 (Ottawa: Office of Energy Conservation, Energy, Mines and Resources, 1976). The relative lack of Canadian work is not as serious a problem as one might at first think, since a great deal of the American work is useful for illustrative purposes given the two countries' broadly similar patterns of energy use.
8. Lovins, "Is Nuclear Power Necessary?", paper prepared for the Groupe de Bellerive Colloquium, Geneva, February 15-17, 1979, mimeo.
9. J. A. L. Robertson, Final Argument Relating to the Canadian Nuclear Power Program, brief to the Royal Commission on Electric Power Planning, AECL-6200 (Ottawa: AECL, 1978).

10. See John Helliwell, "Canadian Energy Policy," *Annual Review of Energy* 4 (1979); also Randall (*op. cit.*) p. 19.

11. For instance, although the report on *Risks of Energy Production* (AECB-1119/Rev 2), produced by the Atomic Energy Control Board, received a great deal of stinging criticism from many commentators for both conceptual and arithmetical errors, almost all the criticism was published and generated in the United States, in forums accessible to Canadian policymakers (and the Canadian public) only with considerable difficulty. To my knowledge, *no* critique of the report was undertaken by AECB or any other official agency, even after the criticism from other sources became widespread. For discussion of the role of the Atomic Energy Control Board see G. Bruce Doern, *The Atomic Energy Control Board* (Ottawa: Law Reform Commission, 1975).

12. B. W. Cone *et al.*, *An Analysis of Federal Incentives Used to Stimulate Energy Production,* PNL-2410-1 (Rev.) (U.S. National Technical Information Service, 1978).

13. Randall,(*op. cit.*) has touched on this issue in his article.

14. Murray Edelman, *The Symbolic Uses of Politics* (Urbana: University of Illinois Press, 1964) and *Politics as Symbolic Action* (Chicago: Markham, 1971).

15. C. A. Hooker and R. van Hulst, "The Environment and Public Political Institutions" in Leiss, ed., *Ecology versus Politics in Canada* (Toronto: University of Toronto Press, 1979).

16. Rianne Mahon, "Canadian Public Policy: The Unequal Structure of Representation" in Panitch, ed., *The Canadian State: Political Economy and Political Power* (Toronto: University of Toronto Press, 1977). Mahon's "unequal structure of representation" assumes particular importance in the energy policy field in view of the control of information and structuring of issues on the part of proponents of specific technologies.

17. *E.g.* Larry Pratt, *Prairie Capitalism* (Toronto: McClelland & Stewart, 1979).

18. *E.g.* François Bregha, *Bob Blair's Pipeline* (Toronto: James Lorimer, 1979).

ENERGY AND THE HCST

The preliminary report of the SSHRC conference on strategic research funding in the HCST field convincingly argues the need to address the question of the interaction between science, technology, and society from a broad multi-disciplinary perspective which attempts to capture that interaction in all its complexity. What follows is a brief response to that preliminary report (hereafter "PR") including a number of suggestions for specific research topics that I consider to be important. While these suggestions and my comments will be directed toward energy issues since that is the specific field I know most about, an attempt will be made to put such issues into the broad context described in PR since I feel that an awareness of the context is crucial to an adequate understanding of the HCST field.

Several times in PR the importance of taking a reflexive* perspective on issues in the HCST field is emphasized. Such reflexivity is important, it is suggested, because modern science and technology are both causes and effects of our present social situation. Their remarkable development is clearly linked closely to the social, economic and political conditions in the context of which this development occurred; at the same time this development is increasingly influencing those very conditions.

In other words science and technology are being turned back on themselves, in the hopes of controlling, or at least managing

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* The term used in PR is "self-reflexive". Surely "self" is redundant.

both the emergence of new scientific discoveries and technologies and also any negative effects of their application. This attempt is not without dangers. The detrimental positive feedback process that can result have perhaps best been described in the environmental literature, where "technological fixes" have come under increasingly critical scrutiny.

The potential problems of using science to manage science are compounded by the fact that we, as scientists or analysts of science and technology, are also products of a specific social situation, a situation which, as noted, is increasingly influenced by the development and application of modern science and technology. Thus we too are both causes and effects of the processes we are studying.

It is this double circularity of cause and effect that makes reflexive analysis, defined here as the self-conscious awareness of the conditions and determinants of the analysis itself, so important. Without such awareness we run the risk of reinforcing and perpetuating the underlying causes of the problems that we are trying to manage, of treating the symptoms instead of the disease. Reflexive analysis then is based upon the "seventh theme" mentioned in PR: a concern with the uncovering of the presuppositions, assumptions and basic beliefs that underly the analysis or practice of science and technology, thus influencing or predetermining the conclusions reached and action undertaken.

A recognition of the desirability of reflexivity helps to destroy the myth of neutrality or pure objectivity.

The realization that not only our actions but our techniques of analysis are rooted in particular sets of beliefs and presuppositions implies the need for what has been called meta-analysis--the analysis of our modes and techniques of analysis--in order to try to come to some clearer understanding of the process of which we are a part.* This is of particular importance because of the prevalence of philosophical positions based upon a belief that scientific analysis is neutral with respect to scientist's presuppositions (i.e. that equate science with knowledge.)

The need for reflexive approaches can be seen clearly with respect to the "energy problem." In few areas is the clash of perspectives so evident or the dependence of policy positions upon value judgements and basic presuppositions so apparent. In order to illustrate the arguments given above, I will briefly discuss two aspects of the current energy problem: (i) the prevalent use of energy forecasting techniques on the basis of which decisions on major energy project proposals are made, and (ii) the nature of the arguments used by influential participants in the energy debate.

At present the main method used by Canadian energy policy-makers and decision-makers to determine the "need" for major energy project proposals is to prepare or commission energy supply and demand forecasts. The results of these forecasts are

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*It is particularly appropriate that the need for reflexivity is expressed in the context of a report concerned with evaluating SSHRC funding priorities since such an evaluation is itself a form of meta-analysis.

the main factors in determining, for example, how much new electrical capacity will be needed in Ontario by 1988 or whether new natural gas exports to the U.S. should be approved.

Though no one would claim that specific forecasts are always accurate, many would consider that energy forecasting represents the best and most objective method of making projections on the basis of which decisions can be made. However, upon closer examination, the objectivity of forecasts in principle, and the role they play in the decision-making process is open to serious question.

In the first place, because the results of the analysis depend upon the extrapolation of past trends and relationships, energy forecasts are inherently conservative, usually painting pictures of the future that look like the past writ large. Moreover, although this conservative bias can be partially remedied by means of the judgemental adjustment of parameters, trends and relationships by the forecaster, this means that the forecaster's beliefs, assumptions and even attitudes about the likelihood of future events become part of the forecast. (Note the potential circularity: such beliefs may well be influenced by previous forecasts.)

These characteristics of forecasts, while known to all good forecasters, become of relevance for this argument in the context of the use to which forecasts are put in the energy decision-making process. As noted, decisions on the need for major energy projects are made on the basis of the supply and demand figures contained

in the forecasts, that is present decisions are caused by expectations of what the future will be. In reality of course it is precisely those decisions that will determine, to a great extent, what the future supply and demand of energy will be. There exist certain physical, technical, social, and economic constraints on future supply and demand but these constraints define a wide range within which actual production and consumption will occur. The level within this range that will be realized will be strongly influenced by government decisions on major energy policy projects such as frontier pipelines or conservation programs.

It is this circular causation that makes the use of forecasts so dangerous: to the extent that they form the basis of policy decisions, they confirm the belief that the decision is the result of future supply and demand rather than the cause of it. This reversal of cause and effect both disguise the nature of the relationship between the policy-making process and energy supply and demand, and also allows decision-making bodies to operate under a cloak of apparent objectivity. In actuality, the claim to be merely responding to the neutral reality of the forecast, like the objectivity of the forecast itself, is spurious. Forecasts do not show us what the future will be like; instead they provide justification for the subsequent creation of that future.

In many ways the use of energy forecasts to justify policy decisions is indicative of a tendency that can perhaps best be summed up in the phrase "social science as physics." It represents the application to the policy-making process, of a still powerful

philosophical position whereby social events are, in principle, as predictable as macroscopic physical events and susceptible to purely objective scientific analysis. The point is not so much that this position is wrong (though I think it is) but that the use of forecasts in the way described here is a classic example of a non-reflexive use of "scientific" techniques that are not neutral with respect to their practical effects. Under the guise of methodological neutrality, particular versions of the future are being created without any awareness, or at least acknowledgement, on the part of decision-makers of the self-fulfilling and circular nature of the process. In other words to the extent that forecasting is an important part of the energy decision-making process, that process is influenced by, and in turn reinforces, a particular view of the role of science and technology in modern society, a view that is not examined or defended but simply assumed to be reflective of the way things are.

If we turn from methodological issues to the energy debate itself we see much of the same kind of thing going on. One influential view of that debate, for example, is that it is caused largely by ignorance and uninformed opposition to large-scale energy projects. From such a perspective the major energy issues are technical ones and considerable specialized expertise is required before it is possible to talk meaningfully about the energy policy options available to us. That is, the energy debate is a debate for experts and large-scale participation by the unqualified public can only serve to confuse the issues and

inject emotional, value-laden judgements into what should be neutral scientific analyses. Even many of those who do feel that public participation should be encouraged, eg. for political reasons, argue that there must be a conscious attempt to separate facts from values and emotions and that the debate should concern itself with the former, not the latter.

It is not clear, however, to what extent the major issues in the energy debate can or should be reduced to questions of "fact" and it can certainly be doubted that the analyses of experts are neutral as between different goals, values, assumptions, and beliefs. Recent arguments by philosophers of science have suggested that observations and facts are often theory-laden, and that meaning variance between theories can occur, even in the methodologically constrained arena of pure scientific research and speculation. How much more can we expect non-neutrality in pragmatically-oriented and politically volatile areas such as energy analysis? It appears that the belief in scientific neutrality is itself simply that--a belief, resulting from a particular meta-scientific perspective. Once again, we see that the behaviour of influential analysts and decision-makers in the energy field amounts to the acceptance of a particular unself-conscious view of the relationship between science, technology, and society.

The purpose of these two example was not to suggest that all participants in the energy debate should start studying the philosophy of science or investigate the presuppositions embedded in forecasting techniques. Rather they were intended to illustrate

in a practical context the general arguments given at the beginning of this commentary. In particular they were meant to suggest that to the extent the SSHRC is interested in the HCST field as described in PR, some attention should be paid to the practical implication of the adoption of different meta-analytic perspectives. If we are to encourage reflexive analysis, it behooves us to be aware of the degree to which certain (non-reflexive) conceptions of science and technology are embedded in different techniques and decision-making processes.

There are two main ways, it seems to me, that this goal might be accomplished. These are: a) to fund research at the meta-analytic level, into the relationship between our conceptions of science, technology and society and the analytic techniques we use, the presuppositions we make and our decisions and behaviour; and b) to fund research based on alternative meta-analytic positions. The first approach represents the development of self-conscious awareness of the implications of our conceptions of the relationship between science, technology and society; the second would lead to practical recommendations based on alternative conceptions of that relationship. While only the first represents meta-analysis as described here, both types of analysis would be reflexive since the explicit statement of the meta-analytic presuppositions adopted would be a necessary part of each. Thus, both types of analysis would contribute to our understanding of the HCST field.

In the context of the preceding discussion, the following specific suggestions for funding priorities in the energy field

are made*. The suggestions are in the form of questions and have been divided up according to the two approaches discussed here. The first set of suggestions thus contains questions that, with some modification, would apply to other fields than energy; the second is more specific.

In keeping with the arguments given here, the suggestions in the second section, though by no means exhaustive, are intended to represent areas based on alternative meta-analytic perspectives that have as yet received little attention compared to more conventional questions concerning, for example, conventional supply potential or financing requirements. These latter, of course, continue to be important questions but it is my belief that an understanding of the HCST field and the reciprocal interaction of science, technology and society will only be attained if substantial attention is also turned towards issues such as those suggested here.

Funding Suggestions

1. meta-analysis

    a) methodological

    --what kinds of techniques have been developed and are used in energy analysis? What kinds of data are associated with such techniques? how are such techniques used in relation to energy decision-making and policy making? are certain kinds of techniques dominant?

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*It should be noted that I am by no means a disinterested party with respect to the recommendations. I am presently applying to the SSHRC for a postdoctoral fellowship to do a study of the potential of backcasting techniques, a study which I recommend here should be done. Moreover, the arguments given here define a general field in which I hope to do more research in the future. Such a close connection between interest and analysis is, of course, a necessary result of the meta-analytic perspective I adopt.

--to what extent do these different techniques embody certain presuppositions concerning the relationship of science, technology and society which influence or determine the kinds of conclusions reached? is there any correlation between the kind of technique used and the kind of conclusions reached?

--how are scientific techniques used to analyse, manage or control science and technology in the energy field?

b) institutional

--do different kinds of institutions (or different institutions) have typical approaches to energy issues? typical methods of analysis? who uses what techniques?

--what presuppositions are embedded in different energy institutions and how do they influence institutional behavior?

--do certain kinds of analysts tend to exist in certain kinds of institutions? does this correlate with the kinds of conclusions reached?

--to what extent is the energy decision-making process biased toward particular presuppositions concerning the nature of scientific and technological development? do alternative conceptions exist in other, less influential institutions?

c) general

--can we envisage alternative conceptions of the role and purpose of science and technological development? what implications might such conceptions have if adopted?

2. <u>analysis</u>

--what is the relationship between different actors in the energy policy field? are interests balanced? how could such a balance be improved?

--what role should energy institutions such as public utilities play? how can desired changes be brought about?

--do "backcasting" techniques offer a useful alternative or supplement to conventional forecasting techniques? are there other alternative techniques? how normative should our analyses be? what are the advantages and disadvantages of different techniques?

--what is the end-use breakdown of energy consumption in Canada today (i.e. tertiary consumption)? how flexible is such consumption? how susceptible to technical fixes?

lifestyle changes?

--is a transition to total reliance on renewable energy flows feasible? over what time period? what obstacles stand in the way? what are the relative implications of such a transition and conventional approaches?

--are alternative energy sources compared symmetrically with conventional sources? in the market place? by decision makers?

--what is the total social cost of different energy policy paths? what are the social, political, institutional, and environmental implications of different energy futures?

--what is the present role of public interest groups? should it be strengthened? how?

--to what extent is more general public participation desirable? how should it be encouraged?

BRIEF TO ONTARIO REGIONAL GROUP ON RESOURCES AND RESEARCH PRIORITIES IN THE FIELD OF HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY--SSHRC

Research Priorities in the Problem of Worldwide Proliferation of Military Weapons and the Militarization of the Social and Economic Order.

In the Preliminary Report on the Human Context for Science and Technology submitted to the SSHRC Strategic Grants Programme, Professor C. A. Hooker identified five major "Malthusian dilemmas" facing mankind today, where uncontrolled scientific and technological growth runs into the "real limits built into the structure of life" (Hooker, p.--). The fifth of these, emphasized by Hooker as a singularly important yet relatively unscrutinized dilemma, was "the increasingingly massive and intensive proliferation of military weaponry, especially nuclear weapons, of increasing technological sophistication, and their deployment throughout the world." The increase in world expenditures on military hardware and the devotion of increasing proportions of natural and human resources to military research and development in the past decade alone are little short of explosive.

One of the most significant aspects of the burgeoning expenditures on armed forces in the world, over $400 billion in the past year, is the increasing participation in the arms trade by developing countries. At present nearly 75% of the international weapons trade involves exports from the developed world to the Third World, an increase of over 300% in the past ten years. This growing commitment of already

scarce resources to military hardware by societies least able to afford it has profound social and economic consequences.

This process of global militarization is well documented by a number of investigative groups, including the Stockholm International Peace Research Institute, the London-based International Institute for Strategic Studies, and the U. S. Arms Control and Disarmament Agency. Analyses of the social and economic consequences of this phenomenon are also undertaken in a variety of institutes. While Canadian research into these questions is not as far advanced as in some areas, Canadian resources are briefly surveyed in Section II of this brief.

Arsenals of conventional and nuclear weapons are growing in absolute numbers, in the number of countries possessing them, and in technical sophistication. In the process industrial research and development along with production capacity is increasingly concentrated on the military sector--in short, there is a militarization of the economy. It is necessary to examine the extent to which this process of the militarization of industrial capacity influences military procurement policies, aid policies and, ultimately, defence and foreign policies. For example, because defence policy is influenced by available military equipment, the process that determines the availability has a direct bearing on policy. In Canada this leads to inquiries about the extent to which the Canada/U.S. defence production sharing arrangements integrate the Canadian defence industry with that of the U. S. From that must follow inquiries into the extent to which the integration of Canadian and American defence industries, an arrange-

ment within which Canada serves as a supplier of component parts for U.S.-designed weapons systems, determines the type of military equipment procured by Canada, and into the extent to which the procurement of U.S.-designed systems shape security policy planning in Canada.

Internationally, to what extent does the trade in weapons between industrial suppliers and Third World recipients commit the latter to pursuing security policies shaped by the interests of the former? Or, with regard to nuclear weapons, what is the impact of technological innovation in nuclear weapons delivery systems upon targetting doctrines such as mutual assured destruction and counter-force?

Domestically, what is the impact of spending on military equipment upon technological innovation in civilian industry? What is the impact upon weapons production and procurement on capital formation within the economy? Is, as suggested by Bruce Russet, military production financed by the draining of capital away from civilian and social service sectors of the economy?

Do developments in military technology guide defence policy, rather than policy objectives guiding technological innovation? And if significant sections of North American academic and industrial research are devoted to military purposes, then an understanding of the relationship between value and technology is essential to an understanding of the development of concepts of national security.

While the arms race and high levels of military spending are readily recognized as a problem concerning the great powers, the role of Canada is frequently overlooked or misunderstood. Even a cursory look, however, at Canadian involvement indicates the need for major

research into the social, political and economic consequences of Canadian policy:

1) Canada has in the past 15 years consistently been among the top 10 of the world's arms exporters;

2) through the Canada/U.S. Defence Production Sharing Arrangements Canada participates in the supply of components for major U.S. nuclear and conventional weapons systems;

3) Canadian military production is concentrated in "high technology" industries such as electronics, avionics, and aerospace; and

4) Canada participates in two military alliances, involving direct Canadian participation in both nuclear and conventional deterrence.

A variety of research questions derive from this involvement. In the case of the recent Canadian decision to purchase F18A fighter aircraft, for example, the requirments of the Canadian defence industry were clearly important. To what extent did the needs of the industry take precedence over the requirments of defence policy (with the result that policy will be shaped by equipment rather than equipment being shaped by policy)?

PART II Research Topics

Canada is well situated to undertake research into both the international and domestic dimensions of these questions. Prime Minister P. E. Trudeau, at the 1978 Special Session of the UN General Assembly on Disarmament, stressed the need to "suffocate the arms race"

and the federal government has since then taken some initiatives to strengthen Canada's commitment to search for alternatives to the spiralling arms race. Among these initiatives are the appointment of a special advisor on disarmament and arms control, active participation in the UN Experts Group on Disarmament and Development, and the recent announcement in the Throne Speech of the Government's intention to appoint a Disarmament Ambassador. While the government has failed to respond positively to the UN Secretary General's request that governments devote one-tenth of one per cent of their defence budgets to "peace research," the initiatives that have been taken can be strengthened by greater attention by the Canadian research community to these issues. The following are some areas of investigation that are in line with guidelines in the Hooker Preliminary Report:

1) the impact of weapons transfers on the social, political and economic development of the recipient country;

2) the impact of weapons technology innovation on defence policy and on concepts of national security;

3) the impact of military production capacity on trade and aid policies;

4) the development of alternative defence and security policies that do not depend upon conventional military technologies and/or strategic assumptions.

5) the moral and philosophical assumptions of strategic studies;

6) nonviolent alternatives of defence and resolution of civil conflict;

7) the relationships between nuclear power and nuclear weapons technology.

PART III Resources

The main focus of research into military issues in Canada has been within the "strategic studies" tradition, in which the overarching objective is the more efficient and effective application of force to particular political/diplomatic problems. The Department of National Defence funds chairs of strategic studies at several universities.

Other research programmes are in place presently which are well-suited to the conducting of reseach in the problem areas proposed. Among these are:

1) The Institute of Peace and Conflict Studies of Conrad Grebel College at the University of Waterloo has conducted research into the moral/philosophical dimensions of strategic planning, and the relationship between military spending and third world development (in the latter case a study commissioned by the UN Experts Group on Disarmament and Development is now underway).

2) Project Ploughshares, a public interest group, has conducted extensive research into the Canadian defence industry and Canadian military sales and contains perhaps the most extensive files on these subjects now available.

3) Private Canadian peace research institutions such as Canadian Peace Research Institute and Peace Research Institute-Dundas have for many years investigated such issues as the correlation of war and the causes of violence.

Submitted by the Institute of Peace and Conflict Studies, Conrad

Grebel College, University of Waterloo.

Conrad G. Brunk, Director

Ernie Regehr, Researcher

THE SOFT HEALTH PATH: AN ALTERNATIVE FUTURE FOR HEALTH IN THE 80's

by

Trevor Hancock

THE SOFT HEALTH PATH: AN ALTERNATIVE FUTURE FOR HEALTH IN THE 80's

When considering the future of health and health care in the 1980's, it is necessary to begin by looking back at the decade we have just left, in an attempt to discern the "wrinkles," the discontinuities which suggest that the future for health and health care will not be simply an extension of the past. Undoubtedly the "medical-industrial complex," which includes the pharmaceutical companies, the medical equipment and supply companies, the hospital industry and the professional associations, and which employs one in every twelve workers in the USA is not an easy monolith to either dislodge from its present powerful position or divert from its present technological course. Nonetheless, there are enough straws in the winds of the 70's to suggest that the 80's might witness a major transformation in health and health care.

Straws in the Wind

In the 1970's we saw a radical re-appraisal of the concept of health and its determinants throughout the world. Among the more significant developments was the "re-discovery" of the importance of environment and lifestyle and the recognition that man is part of and not apart from the planetary eco-system. In the developing world this led to an increasing recognition of the place of health in the development process, as well as some of the adverse health effects of development. The World Health Organization pledged itself to achieving the goal of "health for all by the year 2000" and promoted the Primary Health Care concept as the means of achieving this.

In the industrialized world, the re-appraisal was perhaps best seen in the document "A New Perspective on the Health of Canadians" (the

Lalonde Report 1974) and its imitators in the UK (Prevention and Health: Everybody's Business, 1976), the USA (Healthy People, 1979) and elsewhere. The increasing emphasis on environmental sensitivity and personal responsibility has been popularized by Ardell (High Level Wellness 1977) and others, and there has been a growing recognition that our present values and systems built around them (e.g. economc growth) may not be conducive to health (Draper, P.: Health and Wealth, Roy, Soc. Health J. June 1977). Increasingly, the social and political roots of health and disease were being recognized during the 70's.

The scientific and technological aspects of medical care have continued to grow apace throughout the 70's, though their relevance to health is no more apparent now than before (McKeown, T. in Future Directions in Health Care 1978). What is more, the 70's saw the emergence of serious opposition to the medicalization of society (Illich, I. Medical Nemesis 1975), and an increasing demand by patients, and particularly by women, to be treated with more concern, and to re-assume some personal responsibility.

One reaction to scientific medicine has been the emergence in the Western World of the holistic health movement, with its emphasis upon the appreciation of the whole person and the re-affirmation of the importance of the psyche and the spirit in health and healing. The development of theories and observations demonstrating a "scientific" basis for such approaches has been of great significance, and has served to confirm for Western minds truths which have been accepted for centuries in the East.

The relative unimportance of medicine, and by implication of physicians, in creating health has been noted; one response to this has been a move towards de-professionalization and the increased interest, in

both developed and developing worlds, in the deployment of "para-medics" and community aides is a further recognition of this issue.

Environmental sensitivity, recognition of the need for social change on the one hand and personal responsibility for health on the other, and the growing use of non-physicians and community aides will mean an increasingly important role for public health, which has languished for some decades. We are perhaps witnessing the birth of a second public health revolution, one that will be more global in its outlook and yet more based in local community action than the first.

Thus have the seeds been sown in the 70's for a very different approach to health and health care through the 80's.

Soft Health Paths for the 80's

In his book Soft Energy Paths, (1978) Amory Lovins defines "soft" as meaning flexible, resilient, sustainable and benign, and he describes five characteristics of soft energy technologies: they are renewable; they are diverse; they are flexible and relatively easy to use (and therefore accessible to the general population); they are matched both in scale and in geographic distribution to end-use needs, and they are matched in energy quality to end-use needs. He concludes:

> "The distinction between hard and soft energy paths rests not on how much energy it used, but on the technological and socio-political structure of the energy system, thus focussing our attention on consequent and crucial political differences."

It is not hard to see the parallels between soft energy technologies and many of the changes in the health field that began in the 70's. At the most profound level, the questioning of the givens of our present technological and socio-political structures, Draper (op. cit.) has noted that the allies of the renaissance of public health are to be found in

three broad groups: those concerned with ecological and conservation issues and the socially responsible use of global resources; those concerned with Third World development and international responsibility and those concerned primarily with the philosophical and yet practical examination of social goals and values. In this respect, the development by Skolimowski of an Eco-philosophy which is, among other things, life-oriented, environmentally and ecologically conscious, politically aware, socially concerned, and health mindful will contribute greatly to our re-thinking of, and understanding of, health. (Skolimowski, H.: A Twenty First Century Philosophy, Alternative Futures: Fall 1978) What could be more in tune with the Soft Health Path than Skolimowski's comments that "taking care of one's health is taking responsibility for the fragment of the universe which is closest to one, expressing a reverence towards life through oneself," and that "to be in a state of positive health is to be on good terms with the cosmos." Elsewhere, I have expressed the view that the Conserver Society, as an alternative technological and socio-political structure, holds out a healthier prospect for our future. (Hancock, T. in Canadian Family Physician, March 1980). The Soft Health Path, as it emerges in the 1980's will increasingly lead those concerned with the creation and maintenance of health to focus their attention upon the crucial political differences between a hyper-expansion (HE) future and a sane, humane and ecological (SHE) future. (Robertson, J., The Sane Alternative, 1978)

There are many other analogies between soft technology and what I have chosen to call the Soft Health Path. The need for flexible, resilient and diverse "technologies" is surely mirrored by the emergence of the holistic health movement, with its emphasis upon multiple healing

modalities, the importance of body, mind and spirit, the ability to integrate and utilize both our right and left brains, and the power and possibility of voluntary control of bodily functions. Robert Ornstein first synthesized much of this in his book The Psychology of Consciousness (1972), and the development of this approach to health has implications far beyond the health field. In his book Person/Planet (1978) Theodore Roszak noted that "the road to wholeness leads through the feminine," a thought closely paralleled by Carl Sagan, who noted in The Dragons of Eden (1977) that we need to use both cerebral hemispheres to solve complex problems in changing circumstances: "the path to the future lies through the corpus callosum." Indeed, it may be that voluntary control, necessitating as it does a greater appreciation of the one-ness of the universe, of the interrelationships of matter, energy and spirit and of the interdependence of person and planet may prove to be a necessary precursor of a Voluntary Simplicity lifestyle.

The need for sustainable and renewable technologies is paralleled in the health field by the need for self-sustaining and self-renewing means of becoming and remaining healthy, reducing the dependence of individuals upon professionals and the system for their state of health. This can be seen in the growth, the varitable explosion, of the self-care movements, patients rights groups, mutual support groups and community aides programmes. The need for readily understandable and easily usable "technologies" also underlies the emergence of such groups and movements, and the same need is related to the growing involvement of the community in the planning, running, and evaluating of its health care systems.

In the global context, the Primary Health Care concept is undoubtedly a recognition of the need to match health resources to end-use

both in terms of scale and geographic distribution and in terms of the quality of the health technology. Thus the improvement of health in many parts of the underdeveloped world does not require a few highly qualified doctors using sophisticated technology in large city hospitals, but rather requires many para-professionals and community aides using simple and appropriate technology in a multitude of rural and urban community settings. Nor should it be thought that this approach applies only to developing countries: many of the industrial world's health problems might be more effectively dealt with by community based preventive measures.

Finally, soft technologies are benign, and one only has to read the current medical literature on introgenesis, or more especially Illich (op. cit.) to recognize the extent to which our present hard technology medical care can be malignant.

To sum up, there is evidence that a new approach to health care is emerging. This new approach can be described as the Soft Health Path : it is a synthesis of environmental health, community-based public health, the primary health care concept, the holistic health movement and the self-care movement. This Soft Health Path is compatible with and leads towards a sane, humane and ecological future.

Trevor Hancock is a community physician and works as a public health planner for the City of Toronto Public Health Department. He has been actively involved for a number of years with the Conserver Society concept, and is particularly interested in the interrelationship between environment and health. He is the coordinator of the health and medicine track for the First Global Conference on the Future.

The Health Benefits of Energy Conservation

"I want to close with some comments on what in the long term will be the fundamental determinant of our health. I am thinking of the ecological, energy and resource limitations of this planet.......... I know this matter goes well beyond the normal terms of reference of the health professional........but as people who are manifestly concerned about the well-being of their fellow men and women, I would urge you to extend your mandate to future generations and to support the analysis and action necessary to ensure their survival."

Marc Lalonde, in an address to the American Public Health Association, 1976.

The Peel Regional Health Unit considers that health is a state of complete physical, mental, social and ecological well-being.[1] This amended version of the World Health Organisation's definition of health takes account of the important effect that our environment has upon our state of health: we cannot have a healthy population if the eco-system of which we are a part is unhealthful.

As part of our concerns with health, it is appropriate to consider the health impact of energy utilisation, and the health effects of energy conservation. This consideration cannot be limited solely to the local area of Peel Region, since energy production, transportation,

generation transmission and utilisation at points remote from our locality may have adverse impacts upon the local or even global eco-systems of which we are a part, and upon whose stability and health we are so dependent.

Thus in this brief paper I will begin with a consideration of the more global issues, and end by focussing upon more local issues. Before discussing the benefits to be expected from energy conservation, it is as well to consider the costs and benefits of energy consumption, given that "every energy technology has an adverse impact on the environment".[2]

As Cook has pointed out "....in no facet of human life are the benefits of energy more apparent than in health".[3] He goes on to list some of the benefits of energy utilisation, including better food, hygiene and living conditions, and the benefits of modern medicine. We have more mobility, more freedom, more choice in lifestyles, more leisure and a more urban society. These benefits have been substantial, but are not without their costs.

Table 1, which is taken from an issue paper prepared by Niall Byrne and Donald Cole for the Division of Community Health, University of Toronto, summarises some of the specific adverse health effects of the energy production cycle. It can be seen that every portion of the energy cyle has specific or general health impacts.

There are in addition, some serious implications for health in the manner in which we utilize energy. Cook[3] has noted that "high energy society is urban society" and there can

be little doubt that urban life has some very serious adverse consequences for the physical, mental, social and ecological well-being of urban populations. A high energy society tends to be a high stress society, and the health consequences of stress are becoming increasingly apparent. Even our "relaxation" is very often stressful -

> "......high energy man seeks diversion in sports, business, drugs, sex, rioting and crime,..........whereas in low energy society drugs may be taken to forget, in high energy society they appear to be taken to forget that there is nothing to forget."[3]

One of the most obvious ways in which we use energy is to replace human labour, and this has often been very valuable. The Extent to which we have done so is staggering. According to Gonzalez, the way in which we utilize energy -

> ".......is the equivalent of having 400 mechanical servants working for us 5 days a week, 50 weeks a year. It's a total of roughly 100,000 servant equivalent days per year per person....."[4]

However, having so many "energy slaves" undoubtedly contributes to underemployment and unemployment. The health costs of unemployment can be substantial, and one U.S. estimate is that the 1¼% increase in unemployment in the U.S.A. over the six year period 1970-1975 resulted in nearly 37,000 excess deaths, over 4,000 excess state mental hospital first admissions and over 3,000 excess state prison first admissions.[5]

The Energy-Health Map

Most empirical data and hazard estimates can be related to the following scheme for the "use cycle" of each energy form.

The Energy-Health Map

Stage in Cycle	Specific Health Effects: Occupational	Public Health Community	Flora & Fauna	Ecological System Disturbances
1. Exploration and location	fossil fuels & uranium	isolated community health effects	seismic blasting & drilling operations	oil and gas blowouts strip mining destruction
2. Extraction	coal-- black lung disease uranium-- lung cancer & mining accidents	tailings & initial processing effluents on water	hydroelectric dam flooding of land & destruction of habitats	oil tanker wrecks liquid natural gas explosions
3. Transport	highway accidents			
Conversion Plant -construction accidents				
-operation	nuclear accidents	SO_2, particulates & trace metal air pollution from coal plants		long term climatic change due to CO_2 & heat losses
-waste disposal	nuclear & ash -- transport to disposal sites	nuclear wastes, low level radiation	acid rain -- polluted lakes	
				...5/
.Distribution	electric power lines -- tanker accidents	field effects oil-gasoline exhaust air pollution		
.Utilization	electrical accidents	highway accidents	noise pollution driving wildlife out	increasing urbanization

Various stages do not apply to some energy forms. e.g. exploration and location is not necessary for solar energy.

Another interesting area in which energy utilisation may be said to be having an adverse impact upon health is nutrition. "The total energy used to get food on the table represents 12-15 percent of the total Canadian energy consumption", according to the Ontario Institute of Agrologists, who add that "society cannot afford the luxury of spending scarce energy to produce foods of low nutritive value."[6] Yet that is precisely what a high energy society encourages -

> ".....a system that makes a wide variety of food available to most members of a society, and especially if it is a high energy society, allows, if it does not promote, poor habits of eating and the related secial costs."[3]

Some Health Benefits of Conservation

A. General

Energy conservation can be affected through better management (reducing lighting and heating e.g.); direct efficiency (improved insulation, improved public transport); total thermodynamic efficiency (matching energy quality to end-use e.g. solar space heating, co-generation) and through education and incentives.[7]

The result, according to the office of Energy Conservation, is that "....by relatively straight forward effeciency improvement such as better automobile mileage, better insulation in homes and commercial buildings, adjustment of furnaces, improvements in industrial processes and housekeeping, ...the expected annual growth rate of total Canadian energy consumption would drop from the 3.7 percent estimated in the Energy Strategy Report to less than 2 percent per annum. The effect by 1990, would be petroleum consumption lower by the equivalent of the annual output of 6 Syncrude oil-sands plants, natural gas consumption

lower by 80 percent of the annual Canadian output of the Mackenzie Valley pipeline electricity by the equivalent annual output of 15 Pickering-sized nuclear plants and coal by about 10 million tons."[7]

It is apparent that any energy strategy that can reduce energy utilisation, and thus environmental and health impacts by such large amounts in the coming decade is likely to have a very positive effect upon health.

B. Specific Examples

(i) Transport

Motor vehicle accidents accounted for 68 deaths among Peel residents in 1976, representing 4% of total deaths. More importantly, MVA's accounted for 12.5% of potential years of life lost, which is a measure of premature death. Evidence from Ontario[8], California[9] and Britain[10], has shown that a reduction of speed limits as an energy conservation measure resulted in fewer deaths and injuries. A switch to public transit, which has a better safety record per passenger mile would also reduce fatalities and injuries. There are two other benefits of energy conservation in the transport field: reduced air pollution will have a beneficial effect upon health, and less use of private automobiles may result in increased physical exercise by the population as a whole.

(ii) Nutrition

Energy conservation in the agriculture and food industries can be effected, in part, by using less energy-intensive mechanised and "chemicalised" methods of farming, and producing less over-processed, synthetic junk foods. Such a change would require a shift in dietary habits, with less animal protein and fat, less sugar, less junk, and less processed food. Instead, the diet would be higher in

vegetable protein, fibre and vegetable oils, which is precisely the sort of prudent diet advocated by most nutrition experts today.

(iii) Employment

Renewable energy technologies and conservation methods will create more employment, especially in the unskilled and semi-skilled categories, than will comparable investments in high technology energy systems.[11] Thus the soft energy path may have a beneficial effect upon health by reducing unemployment, and the health impact of unemployment.

(iv) Mental Health

The effects of stress and unemployment upon the state of mental health of our population has already been alluded to. It is the opinion of Dr. Rene Dubos, the widely respected health scientist/environmentalist/humanist, that "many people would experience less boredom and malaise if they reduced their exaggerated dependence on energy-consuming environments and technology, such as air-conditioners, artificially lighted rooms and T.V. sets, and instead, increased their direct contact with natural surroundings and other persons."

In summing up at the University of Ottawa Seminar where he was speaking in 1979, Dr. Dubos stressed that any living being develops its potential only to the extent that it has to do so, is stimulated and challenged to do so. In other words, too many substitute forms of energy that will do our normal human tasks for us will discourage our development as human beings. Instead, we should "live better with less energy."[12]

Finally, I would like to end by reflecting upon the relationship between health and a different sort of energy. Dr. Mahler, Director General of the World Health Organisation, recently said -

> "The greatest potential energy in the world is human energy, and health is the fuel that can generate it. The spark that can fire it is imagination."

Trevor Hancock
Epidemiologist
Peel Regional Health Unit

March 1980

References

1. Peel Regional Health Unit: Statement of Philosophy, Goals and Objectives, September 1979.

2. Fri, W. An Overview of our National Energy Needs, Resources & Future Development, in Anderson, E.C. & Sullivan, E.M. (Eds.) Impact of Energy Production on Human Health: An Evaluation of Means for Assessment. Proceedings of the third LASC Life Sciences Symposium, Los Alamos, New Mexico, LASL 1976.

3. Cook, E. Man, Energy, Society. San Francisco, W.H. Freeman, 1976.

4. Gonzalez, R.J. Energy & Human Welfare, in Ashely, H.; Rudman, R.L.; Whipple, C.(Eds.): Energy and the Environment: A Risk - Benefit Approach. New York, Prgamon Press, 1976.

5. Brenner, M.H. Health Costs & Benefits of Economic Policy. Intl. J. Health Services, 7(4), 1977.

6. Ontario Institute of Agrologists: Energy and Agriculture in Ontario. Alternatives,6(1), 1976.

7. Science Council of Canada. Canada as a Conserver Society. Ottawa, Science Council, 1977.

8. McKillop, H. Effect of Seat Belt Legislation and Reduction of Highway Speed Limits in Ontario. Can. Med. Assoc. J., 119, 1154, 1978.

9. Brown S., Marmot M., Effect on Mortality of the 1974 Fuel Crisis, Nature, 257, 306-7, 1975.

10. Speed Limits and the Public Health (Editorial) British Medical Journal. 6068(1) 1045-6, 1977.

11. McGregor, B. Energy, Jobs and the Economy Conserver Society Notes 1,(1) 29-36. Spring 1978

12. Transition (Journal of the Vanier Institute of the Family) 9, (1), March 1979

Michael Bayles

Why Fund HCST?

Perhaps the dominant reason is that many social problems result from the interface of science and technology with society. Although some work is being done in the field, it needs encouragement because relatively little is understood, many issues are not being examined, and the work is often rather different from much of the traditional disciplinary research. As much of the work is and should be trans- or cross-disciplinary, the work is not encouraged by the standard SSHRC programs.

How Fund HCST?

Particular aspects of funding are needed in this area. First, funding is needed to develop bibliographic and other sorts of resources. Relevant material appears in all disciplines. There are few specialized journals in the area, and standard indexes are not adequate to finding materials. Those collections of resources and bibliographies which do exist do not usually focus on the Canadian context where that makes a relevant difference. Second, research capacity needs to be developed. This should involve (a) designated post-doctoral fellowship; (b) released time for more established scholars to train in the area, e.g., by studying another discipline; and (c) perhaps, support for a few centres to conduct such research. Third, a new orientation to types of funding for research recognizing that many projects will involve relevant scholars from various fields who will not all be at the same institution but may significantly contribute to projects not directly their own. This may require (a) more lenient funding for travel, (b) more lenient funding for consulting, (c) perhaps funding for preparation of publication, e.g., hiring writers to present the results in language and form more accessible to the public. This may include funding publications more accessible to the general public. Fourth, special panels of referees and evaluators who are familiar with the area and cross-disciplinary research. Fifth, a willingness to fund research which is unpopular with certain vested interests in the political, economic, or academic community. SSHRC and other councils have traditionally been willing to pursue the truth wherever it may lead, but it must recognize that proportionately more work in HCST may be controversial and unpopular because of the greater relevance of this field to social issues.

The Human Context for Science and Technology
General Directions and Specific Proposals

by
D Julian M Davies
Department of Computer Science
University of Western Ontario
London, Canada N6A 5B9

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Abstract

This essay is in two parts. The first develops a characterization of the HCST field, and the second makes a specific proposal for research relating to the impacts and uses of small and embedded computers in small businesses.

1.0 THE HCST FIELD

1.1 Introduction

The research field known as ´The Human Context for Science and Technology´ (HCST) has been described from a variety of perspectives in [1]. The field comprises studies on aspects of how the development and deployment of science and technology are influenced by human factors, both individual and social, and covers investigations of how science and technology in turn affect humans: as individuals; in society; through the environment, our cultures, organizational and economic changes, and so on. This calls for studies in a wide variety of disciplines: sociology, economics and social psychology are obvious prime foci. Additionally, the field involves history; anthropology for cross- cultural studies; education, journalism, english, sociology of communication, and the fine arts, to elucidate the propagation of attitudes and myths through the english cultural milieu; french and francophone humanities for corresponding analyses of the french (especially Quebecois) culture; similar studies for the native peoples, and possibly for immigrant groups; philosophers; lawyers; and other specialists for studies

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[1]<u>The Human Context for Science and Technology</u> (Eds. T Schrecker and C A Hooker), SSHRC, Ottawa, May 1980

within specific groups and subcultures of Canadian society, such as the disabled. Last, but not least, statisticians, scientists, engineers and managers contribute many of the data and insights concerning scientific and technical developments and uses, and the prospects for future innovations.

1.2 The HCST Field

The list of disciplines and the generality of the description given above for the HCST field might seem to encompass virtually the whole of the Humanities and Social Sciences. Technology shapes and is shaped by our cultures pervasively, if often without conscious recognition, so that very little would be excluded from a generous interpretation of the ´human context for science and technology´.

Of course, there is a more specific focus to this field, or more exactly, a set of overlapping and related foci. The field is concerned with identifying, describing and conceptualizing the roles played by technology in society and in individual lives and relationships. Science and technology are developed and used by people and groups for a variety of reasons, not all of which are necessarily explicit. There will be effects, not all of which may have been planned or anticipated.

In particular, technological developments - or the possibility of such developments - may affect humans´ views of themselves and society, and may create or affect philosophical or ethical issues in society. This may be seen quite clearly in issues of biomedical ethics, and in reactions to suggestions that <u>intelligent</u> computer systems may come to be developed. More obscure but very important questions arise over such matters as whether the general technologization of our society contributes to a feeling that people are ´only cogs (or digits) in a machine´, resulting in a loss of the sense of personal autonomy and responsibility to others. And if this has happened to some degree, by what means is it mediated, directly and indirectly?

Science and technology are intimately bound up in the structures of our society, notably the economic structures of Canada and of the World. This is because of the dependance we all place on the fruits of technology in our daily lives. Questions are being raised as to how technology affects decision-making in the political, economic, and personal arenas. How do technological constraints or possibilities weigh alongside ethical and other considerations in societal decision-making? How does this affect views of how decisions <u>ought</u> to be taken? To

what extent is it informative to think of parts of the Canadian or the world economy in terms of a "military-industrial complex"? What are the interactions between technological ´demands´ and decisions on energy, on transport, on Northern development, on agriculture, and on communications?

1.3 Need For A Unifying Focal Area

A variety of academic disciplines were listed earlier as involved in the HCST field. Some of these, for instance Sociology and Economics, have considerable literatures which are directly relevant to HCST. However, appreciations of the human context for science and technology are usually fragmented and incomplete. Specialists are sometimes unaware of the work or perspectives which would be relevant to them, even those from closely related disciplines.

Research which attempts to analyse complex phenomena must necessarily sometimes start by simplifying the problem domain to get a good grip on the various factors separately. (This strategy often works particularly well in the physical sciences.) In studying human social phenomona, nevertheless, it is imperative that the various pieces be put together again. There are often interactions and feedback loops between different processes which are critical to understanding the overall system. (In the relatively simple domain of electronic engineering, we know that the nature of any feedback circuits is predominant in controlling the system´s characteristics.) And, for instance, ethical considerations affect people´s lives and actions just as economic considerations do, even though in academic circles studies of ethics and economics are not commonly strongly linked.

The consequences of incomplete and fragmented appreciations of the human context for science and technology show themselves in many problems now facing our society. For example, there is widespread mistrust and fear of modern technology in all strata of society, sometimes displayed by ostrich-like or negative attitudes where public decisions have to be made concerning support or regulation of science technology or research, or where there are technological factors in other decision-making. Again, there is no very soundly based and widely accepted method for the details of conducting and enforcing environmental impact assessments or technological assessments.

We do not have an adequate framework for anticipating or assessing possible consequences of new scientific and technological developments. We do not even have much agreement on where control needs to be exercised in order to

avoid such future catastrophes or threats as have been projected. Frequently only minimal social control is imposed, to avoid immediate economic dislocations, justified by the hope that more technology will permit the projected problem to be avoided altogether, or at least 'fixed'. We have neither an understanding of the past consequences of following this 'do little' strategy, nor have we a way of assessing when it is or is not likely to lead to satisfactory consequences overall.

Many complications arise from the dynamic nature of human society. Not only is the situation changing, in terms of the technology available, and of how it shapes and is shaped by people, but perceptions of science and technology also change, as a result of feedback from and publicizing results of the HCST research itself.

An anthropological and historical perspective shows how entire communities and civilizations are shaped by the technology available (in a broad sense). Witness the "Stone age", the "Bronze age", the "Iron age", the "Industrial revolution", and so on. The opening up of Canada herself, as a nation, has been and is inextricably a product of changing technologies of transport and communications, alongside the historical pressures to explore, develop natural resources, and settle. Nowadays we realise, more acutely than formerly, the limits to the resilience of our natural environment, and the conflicts between different claims for land use, for energy expenditure, for consumption of renewable and non-renewable resources, and between differing conceptions of the "good life".

We are aware now, perhaps more than formerly, that there are distinct groups in our society with differing perceptions and attitudes, and that these differences are also bound up in the dynamics of society. Labour, Women, Native peoples, and the Elderly can be mentioned as groups with distinct perceptions of our society and our technology, while admitting that these class categories often still conceal diversity of attitudes between important subgroups of people.

HCST is a field in which a variety of disciplines and perspectives overlap. It is an area in which disciplines can often usefully be cross-fertilized, by applying concepts and methods in new contexts, as well as through drawing out relationships between different areas of research. Some individual research projects in Canada and elsewhere already have these characteristics and deserve to be considered as HCST research.

The case for recognising a specific reseach area in HCST, as distinct from other disciplinary areas, lies in the importance of institutional support at various levels if

worthwhile trans-disciplinary research is to be sustained. At times of stress, such as shortage of financial resources, there is a tendency for boundaries between disciplines to be sharpened. Research not fitting one of the 'main-stream' categories is liable to be down-graded. Nevertheless, HCST is of especial importance in contemporary society if the many difficult decisions and conflicts facing us are to be resolved on a rational basis.

Research in the HCST field will be directly relevant to some of the political decisions that have to be made about government sponsoring or control of technological innovation and usage. Such research should not, however, be seen as pre-empting the decision-making processes, which properly belong in the political arena. Research cannot dictate or compare values. Nevertheless, research results will clarify the circumstances and longer range consequences involved in the context for decisions, and provide models for understanding how human and technological factors inter-react. Also, deliberate efforts will be made to communicate perspectives on these issues through society at large, and to decision makers and managers in particular. As one result, decision making may become less problematical, since there will be more general understanding and agreement on the nature and extent of risk and benefit in alternatives under consideration.

2.0 RESEARCH PROJECT OUTLINE

2.1 Computerization Of Small Businesses

2.1.1 Summary -

Small businesses in Canada/Ontario, for instance those with the equivalent of 5 or fewer full-time employees, have been able to obtain computer systems in recent years which are capable of useful computation for a cost of under $1000 annualised. The penetration of such computer systems is proceeding apace, along with related services such as software provision and maintenance, hardware supplies and support, consulting services, and so on.

This study proposes a comprehensive survey of small businesses using such computer systems, to identify the nature of this computing environment, and to determine the effects on the businesses and their staff. To this end, a longitudinal study of a sample of businesses, and of a sample of computer-related employees is proposed. This will permit identification and study of the social processes involved in the spread of this new applied technology.

2.1.2 Reasons -

There are two primary reasons for this study. First, such computer systems seem likely to become quite widespread among small businesses, for a variety of tasks including accounting, billing, word processing, inventory control, and process control. The medium and long term effects of this phenomenon on the businesses, and on their employees and staff requirements, are completely unknown. Needs may become evident for education, regulation, or other social actions.

Secondly, since computers are a newly introduced technology in this particular environment, we are offered an excellent opportunity to study the social processes involved in the spread of a new technological tool through society. It will be possible to study the information transfer processes that spread information and misinformation to users and potential users of the tool, to observe how the people concerned react to successes and problems they encounter, and to observe how introduction of a new technology at work affects staff self-perceptions, behaviour, and home life.

2.1.3 Details -

The study will involve conducting a survey of a sample of small businesses meeting the stated criterion, matching businesses which have and have not obtained a computer system, with examples from (at least) urban Ontario, rural Ontario, and Northern Ontario, to represent different environments of communications and supporting services. The initial survey will establish a base-line for future comparisons. A smaller sample (a subset) of the businesses will then be followed longitudinally for at least three years, with a questionnaire and interview annually, to follow changes in the activities and attitudes that may occur.

There will be interviews of managers/proprietors and of staff, to examine the attitudes, beliefs and expectations of the people involved regarding the computer system and its applications, and how it will affect them personally. A sample of the people will be followed longitudinally, also, primarily to investigate what effect if any computerization has on staff mobility.

It is intended to determine answers to the following questions, and others which may arise during the study.

1. What is the economic background to these computer systems? How are they capitalized? Are the systems changing along with the business? Are businesses in this category which computerize at an advantage or disadvantage compared with the others? How does this depend on the functions the computer performs, and on human factors? What were the systems intended to be used for, and what are they actually used for? How does this change?

2. What are the employment and manpower impacts of these computer systems - in terms of both direct employment, and of purchased services? How does this change? Does computerization have any effect on employment opportunities for the disabled, or for members of minorities?

3. What are the impacts on employee roles in the business, on staff tasks, on career progression, employee mobility, and on demands for temporary staff?

4. What impacts are there on job satisfaction? How does this influence later attitudes to computers, - in business and at home?

5. What are the perceived advantages and problems associated with computer systems, from the points

of view of management and of employees?

6. What are the perceived impacts on <u>private</u> and <u>family</u> life, if any, of the computer systems, for the various people involved. Interviews with other family members will be used here.

7. What educational and other relevant services are recognised as available, and what are not? How does this affect the computer users.

2.1.4 Discussion -

Interviews and questionnaires will be designed and administered in the attempt to determine both the economic and the more personal motivations and impacts involved. Subsets of the businesses and some staff will be followed to track the social and personal developments involved in computerization. Since these computer systems are relatively novel, and only partially conform to the images for conventional ´tools´, the public is not generally well informed about the capabilities and limits of computers. Further developments in the computer market-place can be expected, probably including some further price reductions, increasing capabilities, and more varied software offerings, but these changes may be unevenly distributed, either geographically or according to the machines obtained. The longitudinal study may provide valuable insight into the mechanisms by which a new technological tool becomes publicised, distributed, accepted as a tool, assimilated into the public consciousness, and used.

In particular, this study may contribute relatively directly to changing knowledge and perceptions of computer usefulness. The research plan will therefore include provision to monitor this particular feedback process, alongside other relevant education and information dissemination processes.

It can be expected that the market in computers, and perhaps especially in software, will ´shake down´ during the coming decade. Some computers will become obsolete and unsupported. Some persons will discover to their cost that computer software does not always deliver what is promissed, and is often very hard to adapt or ´mend´ by oneself. The responses of the organizations and individuals to these phenomena will also be under observation.

2.1.5 Staff Needed -

The project will be jointly supervised ideally by a Sociologist, an Economist, and a Computer Scientist. Survey and clerical staff will be required to collect information in the field, and organize it.

2.1.6 Finances - to be projected

2.1.7 Bibliography - to be supplied

THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

ONTARIO REGIONAL GROUP

Research Project Description

1. Title of Research Project

Food Additives and Food Technology: A Discussion Paper and Guide to Resources

2. Description of Research Project

The project involves preparation of a guide to issues and resources in the area of impacts of food technologies and chemical food additives. The function of the guide would be twofold: (1) a resource guide for researchers both inside and outside the academic community; (2) a discussion paper around which further research could be structured. The intent would not be to limit future research, but to provide a set of questions/directions which could usefully be explored.

The guide would examine this technology (or, rather, complex of technologies) from a number of perspectives:

I. Food additives and technology -- a brief overview and history. Development of food technologies; current range of technologies and future prospects (e.g. "synthetic foods"). Purposes of technology (e.g. preservation of shelf life; more "attractive" colour and texture; uniformity of appearance).

II. Proponents and users -- size of the food technology/food processing industries; links with associated industries (e.g. chemical products industry). Corporate structure (domestic/foreign ownership) and corporate concentration. Budgets: for research & development, product development, marketing (both to the trade and to the final consumer). Size of the markets involved.

The user-proponent split: the users or consumers of the technology are, in the last analysis, just about all of us. But this category of user is neither the principal proponent, nor the principal decision maker in any stage of the research, development, deployment and diffusion process except the last.

III. Impacts of the technologies -- (a) health impacts: carcinogenic and other harmful properties of some additives; nutritional consequences of the technologization of food production (e.g. the development of white bread). A survey of reported health effects of a range of common additives. (b) social impacts: the elimination of potential for self-sufficiency, and increased dependence on technology and technologists, as we know less and less about where more and more of our food comes from.

IV. Technology development -- how are decisions made to develop and deploy new food technologies? By whom? On the basis of what criteria? Clearly economic criteria are extremely important, but the issue is more complex than that: how widespread among decision-makers is the belief that "consumers" "want" uniformly colored, textured, flavored foods, for instance?

V. Regulatory frameworks -- how is the use of food technology regulated in Canada? In other OECD countries? What are some of the important theoretical issues? (E.g. burden of proof/rebuttable presumption against registration?)

What evidence is examined? How exhaustively or comprehensively? By whom? Does the public have access to the regulatory process? (I.e. is it, in Doern's terminology, professionally open or democratically open? or neither?)

To what levels of information does the consumer have access? What are its sources? What other kinds of "information" (e.g. advertising) are involved in consumer decisions?

Each of these perspectives corresponds to a section in the proposed guide, which would comprise (a) a discusion paper and (b) an inventory of resources for further exploration. This last would include not only bibliographic information but a directory of individuals and organizations currently undertaking research in the field and in some cases methodological observations. (E.g., on a very elementary level, to research a major industry forget about the academic literature; read the trade journals and Advertising Age.)

Possible avenues of distribution for the guide: on a paid basis through SSHRC; publication by a public-interest group (like Ontario Public Interest Research Group); distribution through Centre for Investigative Journalism. The aim would be to make the resources provided in the guide available to as broad a spectrum of constituencies, both inside and outside the academic community, as possible.

It should be noted that the present project deals with technology in the food processing and distribution system. Another entire range of issues is raised in the food production system: its capital- and energy-intensiveness; heavy reliance on chemical fertilizers, insecticides, monocultures, and meat protein production; land use planning. A parallel guide dealing with these issues would be equally worthwhile, but they have been omitted from explicit consideration here to keep the project manageable.

3. Why should this research be done? What is the social relevance of this research?

The food system in "developed" countries represents one of the most universal instances of the influence of technologies, and decisions about them, on the lives of most members of the society. Yet the principal decisions are not made, as noted earlier, by the ultimate users. Regulatory and assessment mechanisms may or may not be adequate to cope with the speed of innovation and the strength of vested interests. A number of factors (for instance, that synthetic flavorings are not subject to the regulatory process in Canada) suggest that in this country at least, it may be at best marginally adequate.

The present project would provide a starting point for researchers in the largely-unexplored field. I can state from personal experience the need for such a nucleus, which simply does not exist in Canada. Indeed, the accessible literature is highly uneven and for the most part poorly documented. It is to be hoped that the existence of the guide proposed would stimulate research in the field as well as avoiding duplication in, and improving the quality of, research currently under way.

4. Why does this research fall into the HCST field?

Th project involves the impacts of a set of technologies and associated institutional frameworks, yet there is no one discipline into which consideration of those impacts obviously falls. Indeed, it may be that much of the subject matter involved does not fall within any conventional discipline.

The value of HCST considered as a field is precisely that it provides a way of looking at issues involving the impacts of science and technology in a trans- or even non-disciplinary perspective. Such a perspective need not and should not lack rigor, but it should allow examination of the structure of issues related to science and technology in a way that conventional disciplinary perspectives do not. The present project, I submit, clearly fulfils that requirement.

5. What approach or methodology would be used for this research?

Partly answered in (2) above. As this application would actually be made under a granting program, a group of researchers would divide responsibility for the various sections of the guide; methodological decisions would be to a considerable extent the responsibility of researchers in each section. For instance, surveys of trade journals are going to be an indispensable component of sections I and II; they may provide a proponents' perspective in III and V, and will be indispensable in IV as well. Similarly, surveys of medical literature will be useful in III, and interviews with regulators in V.

Discussion paper components of each section will attempt (where applicable) to link the particular problem area under discussion with relevant general theoretical debates--e.g. literature on technology development and diffusion in IV; economic theory of regulation in V. In the earlier sections, in particular, the discussion sections will not so much delineate issues as summarize relevant data (although a theoretical/normative component is inescapable).

In all cases, emphasis will be placed on the function of the product of this project as a resource and stimulus for further research, rather than a definitive "answer" to some specific set of questions about food technologies.

6. What <u>kinds</u> of people would be involved in the research (e.g. engineer, physician, theologian, sociologist, lawyer, philosopher, psychologist, etc.)? Would there be a research team? What institutional affiliations would the researchers have (e.g. trade union, insurance company, justice department, public interest group, community group, etc.)?

At least for most of the team, disciplinary background or institutional affiliation are not as important as (a) basic investigative research skills, whether obtained through journalism, public interest research group work or academic research with an advocacy bent, and (b) an understanding of the <u>structure</u> of the issues involved. This, too, can be acquired in many ways: for instance, a trade union researcher with a background in occupational health issues will be far better equipped to understand the controversies over clinical <u>vs.</u> epidemiological evidence than might be a trained clinician or epidemiologist with little experience in the "human context" side of the HCST field.

In some cases, more specific backgrounds will be desirable: for instance, in section V a political scientist familiar with the literature on regulation and with the issues involved, and in II a person with a background in corporate research, whether obtained through public interest groups or through an investment firm.

One further requirement, one I would argue is common to any project in the HCST field: a commitment to the research involved as being genuinely <u>important</u>. My experience has been that this kind of commitment is more important to the success or failure of a research project, especially a team project, than just about any other factor. Since, as this application would ultimately be made, the participants would have been self-selected on the basis of commitment to the project, this criterion would be met in a way it might not be in a project which essentially "hired-on" consultants to work in specific areas.

7. Additional comments.

A certain lack of precision which may be apparent in some segments i. of this application is partly a result of the writer's inability to define the skills involved in a kind of research which mixes equal parts investigative journalism and political theory, and partly a reaction against methodology-as-ritual: the a tempt to circumscribe inquiry in the social sciences with methodological requirements which eliminate all the interesting questions in the cause of designing a scientiform discipline which looks objective.

In fact, one of the attractions of this particular project is that, because of its preliminary nature, it defies methodological categorization, except in terms of some really basic concepts (<u>e.g.</u> comprehensiveness <u>vs</u>. systematic selectivity). HCST's strength and significance as a field is largely that it is content- rather than method-defined; this is the way I regard political science (or political studies, or political economy, or whatever), which forms my disciplinary background as much as I have one, but I am well aware that this view is still a minority one within the discipline!

ONTARIO REGIONAL GROUP

Research Project Description

Inst. Hist.& Phil. Sci.& Tech., Univ. Toronto

1. Title of Research Project

"Biobibliography of Ontario Scientists, 1914-1939"

This project is now about three quarters completed. It is in need of about $8000 to finish the remaining work.

2. Description of Research Project

The biobibliography will be a compilation of detailed information on the lives and work of 2000 Ontario scientists in the period 1914-39. Its chief goal is to provide a data base for historical and sociological study of the nature of science in Ontario and of the relationship of science and society in Ontario.

Except for a few celebrated discoveries, the history of science in Ontario has largely been neglected. One of the chief causes of inactivity is the difficulty of identifying Ontario scientists and research areas. The problem is one which is shared by most fields of Canadian studies, namely,the want of basic research aids. The biobibliography will provide the kind of detail essential for an accurate picture of early twentieth-century Ontario science.

The biobibliography is also basic to an understanding of the role of science in the history of Ontario. Often only outstanding figures are examined for an insight into a period of history. In the case of Canadian science, where few great scientists have been readily identified, this approach has resulted in an assumption of a low level of activity. In fact, however, the project to-date has revealed the existence of over two thousand publishing scientists in 1914-1939. Clearly a large, highly structured, vital community of scientists existed in Ontario. Not only is the existence of this large group disclosed by the biobibliography, but important qualitative structural changes in Ontario science, which were obscured by the focus on individuals, are now brought to light by looking at the community as a whole. These changes involve such key indicators of the state of the province's science as the funding of science by the federal and provincial governments, the application of science to industry, the growing professionalization of scientists in Ontario, the relation of science-technology to the Canadian war effort, and the transformations in the very nature of the scientific ideas and concerns that motivated its practitioners. The biobibliography will thus serve to both generate and answer a number of important questions about the beginnings of the scientific-government-industrial relationship which was so important for the growth of Ontario.

3. **Why should this research be done? What is the social relevance of this research?**
The biobibliography will be of value to many different groups. Historians and sociologists of Canadian science would use the work to complement their own research; for example, there are ongoing studies of Canadian university science, of science in Quebec (1920-1965), and of nineteenth-century federal government science policy. It will also be valuable in current comparative studies of the history of science and the relations of science to society in Commonwealth countries. In published form, the biobibliography would be of much use and interest to the larger public. Some groups, such as the Dictionary of Canadian Biography, would find it a valuable reference source. Others might use it for its list of Canadian scientific periodicals or of Ontario scientific organizations of the period - two basic reference tools not currently available. An introduction and appendices along with the text of the published biobibliography would also serve as an introduction for the non-specialist to the themes of Ontario science in the early twentieth century and hence to the important role of science in our society.

4. **Why does this research fall into the HCST field?**

5. **What approach or methodology would be used for this research?**

The method employed in the project is that of collective biography, that is, assembled information on the lives and work of many individuals. Entries in the work include such biographical information as dates of birth and death, education, occupations, membership in societies, religion, political affiliation,and emigration /immigration. Bibliographies for individuals include all published work between 1914 and 1939. The files of the biobibliography will permit the drawing up of many valuable indices of the state of Ontario science, for instance, the primary areas of research in the province, membership in organizations like the Ontario Research Foundation, numbers of Ontario graduates working for the National Research Council, distribution of scientific manpower in the various branches of science, or NRC funding of university research projects. The biobibliography, therefore, will function as a comprehensive data base for Ontario science during 1914-1939.

6. What kinds of people would be involved in the research (e.g. engineer, physician, theologian, sociologist, lawyer, philosopher, psychologist, etc.)? Would there be a research team? What institutional affiliations would the researchers have (e.g. trade union, insurance company, justice department, public interest group, community group, etc.)?

Historian and sociologist, plus team of part-time research assistants.

7. Additional comments.

THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

ONTARIO REGIONAL GROUP

Dr. D. Brusegard

Research Project Description

1. Title of Research Project

The Nature of Human-Machine Interrelationships in the Household

2. Description of Research Project

The Research has three components:

(a) A household survey which would elicit information and data on

-the presence of certain technologies in the household,

-the household access to technologies present in the neighbourhood or friendship network,

-dollar costs and time used to acquire (i) the technological equipment or system, (ii) the skills requisite to use of the technologies, (iii) repair and service to the technological equipment or systems.

(b) A macrolevel analysis of data held by various sources. A collection and analysis of extant national and sub-national data outlining the historical changes and recent trends in

-the presence of varied technological equipment or systems in the household,

-household expenditures on technological equipment or systems, or services utilizing specialized technology, repair and maintenance costs for extant technological goods, etc.

(c) A time budget diary or recall survey designed to illuminate

-the nature, number, and duration of human-machine interactions taking place over a period oftime,

-the number, nature, and duration of human-human interactions taking place over a period of time--both direct and indirect via some form of technological intermediary.

This type of research would accomplish three things:

-provide a basic pool of data and information which can be used to explore various approaches to characterizing and comprehending the impact of technologies on households and individuals,

-provide a descriptive analysis of the impact of certain technologies upon the household--a microlevel analysis,

-provide a baseline point from which to compare future changes in the household interrelation with technology.

3. Why should this research be done? What is the social relevance of this research?

The household is of prime importance as a unit of observation in the understanding of the fundamental interrelations between man and technologies. While there is much in the literature suggesting that man is both dependent upon certain technologies for his daily comfort and survival as well as grateful to them for their extending and productivity possibilities, we a ctually have very few facts upon which to base such broad beliefs. This research would provide a pool of factual information which could be used by other researchers in attempting to address questions of the human context of science and technology.

4. Why does this research fall into the HCST field?

The home or household setting is the main environment within which human values are formed, taught, tested and altered. Knowledge of the impingement and embrace of varying technologies in this context will increase our understanding of how people adapt to and adopt technologies--how their dependency and self-reliance are possibly altered, how their activities and relations with neighbours and other humans are transformed, how their traditional education and socialization roles are carried out or transferred, how the character of the household changes, e.g. from consuming to self-servicing, etc.

5. What approach or methodology would be used for this research?

(1) Survey research

(2) Data gathering from secondary sources

(3) Time budget diary or activity recall survey

(4) Sociological and statistical analysis of information from (1)-(3) above.

6. What kinds of people would be involved in the research (e.g. engineer, physician, theologian, sociologist, lawyer, philosopher, psychologist, etc.)? Would there be a research team? What institutional affiliations would the researchers have (e.g. trade union, insurance company, justice department, public interest group, community group, etc.)?

Research Team

-sociologist

-economist

-consumer studies specialist

-family studies specialist

-philosopher

Questionnaire and analysis process design

-Research team plus

-consumer interest groups

-family studies interest groups

7. Additional comments.

THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

ONTARIO REGIONAL GROUP

Research Project Description

1. **Title of Research Project**

Technology and Values in Childbirth: An Evaluation of Alternatives

2. **Description of Research Project**

The purpose of this project is to consider the values affected by the use of three technological devices in childbirth and their implications for the childbirth setting. As a result, recommendations will be made about their appropriate use, the childbirth setting, and legal or health policy relevant to childbirth.

The three technologies to be considered are anesthesia, labour inducing drugs, and fetal monitoring. In recent years, a vocal minority has raised a number of questions about these technologies. Some people contend that some anesthetics adversely affect infant outcome and that with adequate preparation of women are usually unnecessary. Labour inducing drugs, some claim, are frequently used for the convenience of physicians or pregnant women rather than the well-being of infants and may cause needless stress for the fetus. Finally, fetal monitoring has generally led to much higher rates of delivery by Caesarean section, placing women at greater risk but also improving infant outcome by early detection of stress.

At least four values are affected by these techniques: the psychological experience of women and their families, maternal-infant bonding, maternal morbidity/mortality, and infant morbidity/mortality.

These values and technologies affect and are affected by the type of setting for delivery. Four different types of settings are possible: traditional hospital delivery room, a hospital birthing center, a nonhospital birthing center, and the home. The reasonableness of using the specific technologies as well as others varies with the setting. For example, fetal monitoring is unlikely to be used in homes or nonhospital birthing centers because facilities for Caesarean section are not readily available.

Among the questions this study will attempt to answer are the following. Should the use of anesthesia be at the option of the woman? Should natural childbirth be encouraged to decrease the use of anesthesia? May labour inducing drugs be justifiably used for non-medical reasons, such as the convenience of the woman or physician? Should fetal monitoring be used in all cases? If not, when should it be used? Should home delivery be legally prohibited except for emergencies? Should child birth centers be encouraged as cost-saving and psychologically more rewarding settings for delivery, or is the

risk for infants too great? To what extent may potential parents justifiably risk the health of their unborn infant for psychological benefits for themselves (and perhaps the infant)?

3. Why should this research be done? What is the social relevance of this research?

Childbirth procedures affect a majority of women and all newborn infants. A vocal minority object to standard obstetrical procedures, often due to the technology involved. Some physicians have said that they would testify in court against parents who chose to have childbirth at home; home birth, they contend, amounts to parental neglect, and if an infant dies, to manslaughter. The various issues involved are not simply empirical ones about the safety of various techniques but also value ones about the weight of health risks versus other values and risks to one group of persons (women) versus another (infants).

4. **Why does this research fall into the HCST field?**

This study concerns (a) the effect of technology on human values, (b) the situation in which that technology is used, (c) an instance of a choice between high (hard) and low (soft) technologies, and (d) an instance in which the failure to use available technology (hospital delivery) is generally condemned by medical policy and perhaps the law.

5. **What approach or methodology would be used for this research?**

The project would involve an interdisciplinary team meeting four times for two days each over the period of a year or so. For each session, background papers would be prepared and distributed in advance and specific persons designated to make brief critical comments to start discussion. The four sessions would be on the following topics: (1) the technologies--their use, safety, etc.; (2) the values at stake--an analysis and discussion of each of the values identified and others; (3) childbirth settings--an examination of each of the alternatives, their advantages and disadvantages, etc.; and (4) policy and guidelines--bringing the previous discussions to a close by formulating guidelines and recommendations. No empirical research would be done, but the best available data on the technologies would be assembled. The values would be subject to conceptual and normative analysis.

6. What kinds of people would be involved in the research (e.g. engineer, physician, theologian, sociologist, lawyer, philosopher, psychologist, etc.)? Would there be a research team? What institutional affiliations would the researchers have (e.g. trade union, insurance company, justice department, public interest group, community group, etc.)?

The research would consist of a core team with extra consultants brought to each working session. The core team would consist of at least the following: (1) a traditional obstretician; (2) an obstetrician from a hospital or nonhospital birth center; (3) a delivery room nurse or nurse midwife; (4) and (5) at least two women who have had children, preferably both of them having delivered in alternative settings (with and without the technologies); (6) a lawyer; (7) a psychologist with expertise on bonding; and (8) and (9) at least two ethicists with work in bioethics. Not all of these people would come from the same institution; indeed, preferably no more than two would come from the same institution, and the women would be lay persons.

7. Additional comments.

For Illustrative Purposes Only

THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

ONTARIO REGIONAL GROUP

Research Project Description

1. **Title of Research Project**

What Constitutes Acceptable or Responsible Risk in Mine Safety?;a Case Study in Social Ethics.

2. **Description of Research Project**

Four years have passed since the report of the Royal Commission on the Health and Safety of Mine Workers in Ontario appeared. In the interim a number of accidents have occurred in Ontario Mines highlighted by the death of three miners at a Denison Mine site in June,1980. This brought the number of deaths in Ontario as a results of mine accidents in 1980 alone to 17 by July of that year with an average of 11 per year over the past three years(G7M,July 15(?),1980). The result has been the appointment of another commission of inquiry jointly representing the Federal and Provincial governments(G.&M. July15?,1980).

At this juncture mine owners have complained of undue restrictions on them as a result of concern over safety(G.&M. July 17,1980). While it is recognized that there is no "risk free" social order the question of mine safety raises basic ethical dilemmas as to how to weigh the "costs" and "benefits" of contemporary technology over against the value of human life.

The purpose of this research would be to analyse and clarify the bases upon which different positions are taken and defended on this issue.

In order to reach the research goals it will be necessary to review the text and recommendations of the 1976 Royal Commission and to ascertain the bases of its findings. It will also be necessary to examine the actual policies and practices of the major mining companies in Ontario(perhaps if feasible all of them in order to include small mining operations which may be in violation of regulations) and ,as a control and contrast,those of at least one other province. This will involve not only search of the relevant documents and

available literature but field investigations as well. Reasearch assistant must necessarily include at least one person with technical expertise in the field of mining safety.

3. Why should this research be done? What is the social relevance of this research?

It is obvious that this research should be done by as disinterested a party as possible regardless of what other parties may be doing it. A team of researchers whose purpose it is is principally to clarify what is at stake is different from that of a government commission whose purpose it is to assist in public policy making though the two functions may overlap. Other interested bodies may also serve worthwhile purposes which are related to the purposes of this research but its purpose would primarily be that of an educational one, that is; to show the relationship between underlying presuppositions, ethical values, moral choices and concrete human action in so far as this issue is concerned.

4. **Why does this research fall into the HCST field?**

Again, I think it is obvious that we have here an excellent illustration of the relationship between the human context and contemporary technology in the service of what we regard as our ecomomic needs.

5. **What approach or methodology would be used for this research?**

Since the purpose of the research is primarily clarification and a team would be involved the final methdology to be used would be a multi-or trans-disciplinary one that would take account of the insights derived from each member of the team. see #6.

6. What kinds of people would be involved in the research (e.g. engineer, physician, theologian, sociologist, lawyer, philosopher, psychologist, etc.)? Would there be a research team? What institutional affiliations would the researchers have (e.g. trade union, insurance company, justice department, public interest group, community group, etc.)?

I would think of this research as requiring a researcher who is either a mining engineer with special competence in mine safety or someone sufficiently close to the field that he, or she, would be well aware of the technical feasibilty of alternative approaches. It should also include a social scientist familiar with the field of public policy formation. It ought also to include a theological/philosophical ethicist. If not both in the same person then in two separate members of the team.

7. Additional comments.

This research suggestion has been prepared in haste and is purely for illustrative purposes. It is open for criticism and creative suggestions.

THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

ONTARIO REGIONAL GROUP

Research Project Description

Philip C. Enros SSHRCC Postdoctoral Fellowship Project 1980-81

1. **Title of Research Project**

The Emergence of Industrialized Science in Ontario 1914-1939: A Study of the Extension of Research Science to Government and Industry by Ontario University Scientists.

2. **Description of Research Project**

The project is a study of the extension in Ontario of research science to government and industrial laboratories in the period 1914-1939. Previous to this time research science had been located almost completely in universities. With the shift in setting, science underwent a fundamental change in its size, funding and structure with consequent stress on its ideology and ethics, both formed in an academic setting. The project will focus on the function of academic science in the transition to industrialized science. It will provide a detailed study of the process and causes of the movement to industrialized science in Ontario. It will examine the role of academic scientists in this transition. And the project will also study the impact of the shift on Ontario science in general and Ontario academic science in particular.

WESTERN REGION REPORT

BACKGROUND PAPERS

Note for a meeting of "A Western Regional Group to Further Explore Resources and Priorities in the Field of Science, Technology and Human Values".

This is a marvelous field to investigate both for its intellectual interest and its centrality to modern cultures. At the same time it is so vast, so tempting to oversimplify on the one hand or to make the researcher feel too humble on the other. I suffer a bit from the latter. However, it seems to me, you have made impressive beginnings.

Two Keys: Interdisciplinary, Creative, Feedback of Actor-Evaluators

In an overarching way I see two keys to this project: one, is the interdisciplinary basis of its intellectual scope, its required methodological innovations and indeed of its very social organization, and (I would guess of its ultimate recommendations). Let me at this point qute from John Kemeny who as the 1980 Karl Taylor Compton Lecturer at the Massachusetts Institute of Technology, John Kemeny - president of Dartmouth College and chairman of the President's Commission on Three Mile Island - recently shared his experiences on that commission and his insight into the challenge society faces in coping with technological problems. Following are excerpts from the lecture. The edited text will be published in the magazine Technology Review.

"My conclusion" he says " is this: . . . .
"First of all, what's lacking to me on the federal scene (U.S.) is the existence of respected, non-partisan interdisciplinary teams who could at least tell us what is possible -- and what the pluses are amd minuses are - on various different solutions for energy or inflation or any of the other problems.* (I note with some amusement, however, that when Kemeny plugs the universities in his second of five recommendations) and says "But there's a SECOND ROLE FOR UNIVERSITIES ......" (the first was a plea for more funds for long-term research). "Seeing the difficulty today's leadership has in grappling with these problems we must think very, very hard as to how to educate the next generation of leaders so that they can, as individuals, not at second hand, understand and come to grips with the monumental issues of the nation." My amusement lies in his omitting to call for an interdisciplinary basis for that education in the universities after his forthright call for interdisciplinary teams at the federal level.

Two: along with interdisciplinarity is the constant requirement of a process of discovery and invention linked to a process of constant evaluation. To refer to Kemeny again, he found that in Three Mile Island the machines were excellent, the information system long out of date "And, of course, as I told you before, they also had no systematic way .... of learning from experience".

*Perhaps I will have secured copies of Kemeny's other conclusions or even the whole printing that I have here from The Christian Science Monitor May 8/80 (EJA).

In effect in two I am suggesting the need to have in constant use a feedback model of externalizing some behavior into concreteness and then immediately evaluate it in the feedback from it, this evaluating itself becoming a new criterior for doing something (changing, adding etc.) to the original concretion and the process continuing until . . . . what? satisfaction, fit failure or whatever is recognized and a new cycle begins. I call this process creativity since it seems to me to justify the term.

Well, it seems to me that this project must be based then on an interdisciplinary creative set of processes. So, likewise the implementation of any actions or organizations stemming from it. So indeed must be its relation to the SSHRC and such must be the processes and organizaions of Government itself.

An Image of Man

If I don't misjudge the case, and it is true, that Science, Art, Technology and Human Values and Social Process and Social Structures are ultimately all valued in each other, and determined in each other, and if models of creative interdisciplinarity are the necessary methodology of their reuniting, then a most fundamental problem before us is to create a new image of man. Consider how atomistic is western cultural man. He has a "rational mind" that leads to "science"; agressiveness and acquisitiveness that lead to "technology; emotions that interfere with the above and moreover that lead to "error or love" or "Art". He has likewise a soul or a spiritual nature that leads to "Religion" or finding "God". These are all discrete aspects, qualities or actions of western man that moreover find their mirror in the specialization of his personality or career and in the discreteness of his disciplines.

A new image of man could very conceivably lead to a new context of human behavior. By the way, let me quickly note that any image of man is likely to obtain only if it is supported in the patterns of human interactions and, in general, in social structure.

Three Patterns of Action

Now broadly speaking let me identify three such patterns of interaction, (1) Power, (2) Authority and (3) Creativity.
(1) Power lesds to social conflict and unpredictability, idealogues to the contrary, and to the pyschological stance of least commitment in behavior; there may be a source of confusion here in that the ideologues are fully committed to their ideology but their behavior will be "ends justify the means" and so on, and thus any power player must use least commitment and amassing lines of action as the basic strategy of action.
(2) Authority leads to (or is) predicability and stable or even static social interactions and organizations. The expectations of each are reflected in the commitments of another and the evaluating processes are performed by tradition or the collectivity. Behavior is consequently role centered and organized. Personality and role or roles tend to be identified with each other.

(3) Creativity is change and innovation but usually (contrary to popular belief, perhaps) crescive the participants in the process serve wholly as actor-evaluators. Many criteria, many lines of action are used in the process. As the process develops so does the actor. Most commitment is the psychological style. However, the process has usually been identified as uniquely individual, in effect, in the romantic mode. Consequently even if it is agreed that the amplification of this pattern of interaction is "Man's Hope", the exploration of the multi-personal and interdisciplinary methodology* is critical.

Another aspect of the romantic view of creativity is that it expresses itself as art. Needless to say it expresses itself in all ranges of human behavior and certainly almost inevitably as technology and even, although more infrequently, as science.

Well, after these notes, I find myself saying yes but!--what about the problem of numbers i.e. sheer demographic size, what about geographic spread, what about the sometimes necessary patterns of authority, what about the problems of implementation? How can we get this creative, interdisciplinary process into action and keep it going. After all in the general case government and most of our institutions (including most universities, most of the time) work in the authority patterns (or modality) not its creative one and not with interdiscipliarity. Yes indeed these are only some of the hurdles.

And has anything ever been clearer than the urgency of implementation of the feedback actor-evaluator model, now here in this country which is facing enormous changes, consequent to either planned (or as is often the case) unplanned scientic-technico impositions on the social structure - e.g. computoring, agro business, uranium processing, pipeline building, political separatism, state ownership and controls, the world of the multi-national corporations as the new socio-economic-political form and etc.

Here we are as a society, like most of the western world, locked tight half-way between "replacement and repair" of our technology, of even our social forms, of our conception of man. I don't think we can go back to repair (but we make moves to do so - e.g. increasing outlays for technical schools); we don't seem to be willing to support the creative-interdisciplinarity of long-term science that would enable us to move to a world of replacement (cutting back, losing faith in science); we have some suggestions that would reverse our cultural flow such as small is beautiful, progress is a naughty word.

*One contribution to this is a small good bok "Conceptual Block-busting" by - ADAMS, pub. Circa 1976.

A Project

The case of the automobile might be instructive here - I refer to the question of car size. The matter is in process, of course, but here is indeed a possible place for detailed study of some of the processes of technico-scientific and human changes.

Some Western Thoughts

This group here at the Kananaskis Centre is recruited from Western Canada and some western flavor or input, I gather, would not be amiss. It seems to me clear that the project before us is a world problem, not even limited by culture still less nation or region. Still, of course, the more one zeros in and brings the matter into regional perspective there are things to explore. Some few suggestions follow: the question of social age, is critical - so for instance western Canada is mostly very young, meaning much technology can be modern and much techno-social innovation could occur. For example, dry land farming and large scale technico-scientific implementaions in agriculture and the social forms of agro-business. The two dominant socio-economic-political innovations in the west NDP and Social Credit certainly are partly a function of this newness. It is interesting to note that both of these systems are based to a large degree on American Populism and at best in a certain sense, on a somewhat congregats human context. It is also probably more than received wisdom that Westerners are more open, friendlier, more on the surface, etc. Well after all there is also the question of space. We have lots of it, we also were the last frontier -- both factors which influence the style of human behavior and interactions. Of course we grew up with a sense of exploitation too (by Ontario of course) so a kind of paranoia is endemic. Moreover there is plenty of ambivalence toward England and the other old countries of the West's population. Toward the U.S. there is constant attention since they are our touchstone, they are world class, they are our reference group. But his also produces much unease, much rebellion, much paranoia. Of course even the Canadian West is more than one region, for instance maritime B.C. is certainly somewhat different toward both England and the U.S. Moreover the western region was an open one, now with the growth of new cities with heavy centers of gravity and regions shaping around these cities. a new west is in process of becoming. Moreover I have always been fascinated by the fact that national boundaries on the one hand and the absence of (infrasturcture? technology? e.g. roads, rails etc. running north-south) have prevented the important prairie

Canadian cities from exercising their proper economic and cultural influence over the triangle bounded by Minneapolis, Denver and Spokane, or if you will, Seattle. There is ther a large area with many towns and some small cities, much production of various sorts and etc. and yet if I am not exaggerating too much, there is no city in that vast area more than half as big as Saskatoon, the smallest of our larger prairie cities. Canada does run East-West but there is a North-South pull, perhaps it is felt and will be felt most strongly here in the West. We can and should be a centre, not the terminal. Here is a problem where I think the human context and the implications of science-technology in its physical and social forms (e.g. cities) will break the political forms unless some real political machine creativity is brought to bear.

A Case of Synergistics

Clearly a project such as the one that brings us here is implicitly or explicitly a search for synergistic outcomes to Science and Technology in a Human Context. Recently I read some reports that seemed to provide an area of such a possibility. Thus given then that we need fuel, given then that its prairies have much land, little water, some likelihood always of drought, a certain capacity for agro. innovations (mainly dry farming innovations) and also social innovations, given all this I bring (what I read) is the good word about the Jerusalem Artichoke. This neglected plant will grow with very little water on poor soil, with little attention and can be converted to three times the alcohol volume of an equal acreage of wheat. If my information is confirmed, if prairie farmers can bear the impiety of production for alcohol, if some agency will build the distilleries and arrange for distribution of the fuel, why then a lot of the risk of prairie farming would be alleviated and a great contribution could be made towards fuel self sufficiency!!! But who knows what evils will be generated along the way by such innovations? Hence once more here's a clear case for the need for creative-interdisciplinary teams to set the project up and then an equally clear need for creative-interest. Monitoring the various stages of social realization

A Further Methodological Note

The interdisp.-creative feedbak design should not be used in the original instance to create a theoretical interdisp. integration. Rather, in the first instance this design should be directed at problems creating, problem solving, problem evaluating etc. In effect the theoretical foundations - perhaps paradoxically- should come after problems have been successfully handled. There

is ample evidence that the method works to solve problems. The interdisp. theory will come later when new worlds of shared experiences, shared successes, shared language and concepts will have emerged from the problem undertakings.

One more methodolgical point: there is no fundamental antagonism between full commitment and the generation of humour. It is only <u>that people often make it seem as if there</u> is.

I regret that what I have written is not more closely tied to the Hooker Paper and the Tester Outline. Yet while most of what I put down is stuff that dances around my head, putting it down here and in this way and for these purposes did of course develop from these papers and for this occasion.

WILLARD ALLEN

REACTIONS TO HOOKERS' PAPER ON THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

The Report leaves me with more questions than answers. I do not understand the sense in which SSHRC uses the term "strategic funding." Is this a question of the development of research capabilities in certain areas of the social sciences and humanities, or is it a part of the strategy to seek solutions to certain recognized national problems? Is it a strategy to develop research capabilities in certain institutions or certain regions of Canada? Support for each of these interpretations can be found or read into various parts of the Report.

If the first interpretation is used, then it seems to me that the Report fails to provide any clear focus on those disciplines or research areas which should be developed. Clearly if we in Canada attempt to deal with a complete range of problems in all of western society we shall fail to have impact in any area.

If the second interpretation is valid then we need to have a clear understanding of how science and technology, in the Canadian context, relate to science and technology elsewhere. It is obvious to me that we do not have, in any important area, a Canadian science or a Canadian technology in the sense of independently developed or controlled bodies of knowledge or theories or operations. We do have groups and individuals who share or who have shared in the development and use of an international pool of ideas, techniques, equipment, and resources. We do have some identifiable Canadian problems, experiences and applications, but there are no discrete Canadian solutions.

In the case of the third interpretation there is, in the Hooker paper, neither an analysis of the existing strengths or weaknesses across Canada, nor any proposal to acquire such information.

I do not question the desirability of discussions or studies which might lead to the development of global theories of scientific development or the interactions among science, technology and society. Nor do I reject the need for society through its governments and private or public agencies to develop means of directing, limiting, or encouraging the applications of science and technology in particular directions.

I am firmly convinced, however, that before such theories can be developed or adequately tested, or before mechanisms for such direction or control can be devised, we must have a considerable body of verified information, and we must develop and test simple relationships and limited models. Some of these relate to individual scientists and/or technologists, others to the interactions and mechanisms by which science proceeds and technology operates.

Let me suggest a number of basic questions which must be addressed:

(1) How do individual scientists and technologists operate in their narrow professional activities? What motivates them? What leads them into one field or attracts them to one problem, and what causes them to avoid or to drop another? How do their private political and ethical concerns affect their activities?

(2) How do science and technology interact? How do scientific discoveries and thinking become incorporated in technology? How do technological developments affect science?

(3) How do technological discoveries become incorporated in the productive and other activities of society? What are the mechanisms and pathways of adoption? What are the driving forces? What are the inhibiting factors?

(4) How do the concepts or techniques of science influence our thinking in other parts of our lives or our society? How do the concepts of the humanities and the social sciences influence the theories and practices of science? What transfer learning is there?

(5) What effects do general social, economic and political conditions have upon the growth and development of science and technology generally, and how do they influence the directions which science and technology take?

If SSHRC wants to address the strategies of research, let me suggest something about the tactics which are appropriate. Dr. Hooker in his Report refers to "big science" and "little science." Let me suggest that in the HCST area we should begin with "little science." We should encourage case studies in a Canadian context of the ways in which scientific concepts have been converted to technological use, and how technology has become incorporated in our Canadian society. If we are to focus on western Canada it seems to me there are some very obvious and specific areas of study; for example, agriculture.

> What have been the mechanisms by which new techniques of cultivation have been developed and have spread throughout western Canada? What were the sources of ideas about strip farming to reduce soil erosion, and what factors lead to their acceptance or rejection in particular regions and by particular groups? How has harvesting technology changed? To what extent did western Canadian farmers or agricultural experts design or specify equipment and methods to meet our needs, and to what extent have we merely adopted equipment or ideas developed elsewhere? What have been the channels of communication, and the pathways of decision?

In many ways Canada has lead in the technology of storage and transportation of large volumes of grain. How is this related to our climate and to our geography? To our political and economic structures?

In more recent times, how have chemistry, entomology, and plant science contributed to or directed the development of herbicides and insecticides? Has the technological development followed or lead the scientific development? Has use been based upon adequate studies of economic. ecological, and medical affects and risks, or has it largely resulted from organized salesmanship or spontaneous development of demand as a result of the widespread availability of technical information?

To what extent has science, independently developed, made possible the exploitation of mineral resources, and to what extent has the exploitation of mineral resources lead to the development of the necessary science?

Similar studies may be proposed in other areas of interest.

Studies such as these would address questions (3) and (5) on my list above. My recommendation is that at least in its initial phases, the "strategic" programs aim at a coordinated series of case studies such as I have suggested. At a later stage, the development and testing of concepts or models could be promoted, with the case studies used as a data base.

Independently of this, SSHRC might fund research on more general problems such as my questions (1), (2), and (4).

I do not believe that we are at a stage where much useful work can be done on "grand theories" in the HCST area, and I

strongly oppose funding of "bell-the-cat" studies as implied in Hooker's Paper. We simply do not have an adequate understanding of the subject. Controlling a cat without good knowledge of cat behaviour, anatomy and physiology (can we distinguish between domestic cats and wild cats?) is akin to prescribing measures to control the Black Death without knowledge of rats, fleas and germs or their role in the plague. As to regulations and laws, prohibition in the early part of this century and our present problems with legislative control of alcohol and drug abuse demonstrate the futility of simplistic approaches to complex problems. Perhaps these examples also suggest the kind of time-frame we should be looking at!

In summary, my recommendation is for a program of specific case studies, selected and coordinated so as to produce valid information for use in the later development and testing of concepts and theories related to the HCST area.

Willard Allen
Professor of Chemistry
and
Associate Vice President
(Academic)
The University of Alberta

WFA/db
1980-05-14

THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY: A FEW COMMENTS

Park Davidson

The Department of Psychology

The University of British Columbia

The move by the Social Sciences and Humanities Research Council into strategic or directed funding is an exemplification of a paradigm shift that is going to be very challenging to the humanities, and to a lesser extent the social sciences, in Canada. Contract research nearly always evolves into a "problem-solving" orientation (in contrast to the "knowledge-building" orientation of grant-in-aid research). Problem-solving contract research has a long history in applied sciences such as engineering, most of the health sciences, and a few social sciences such as clinical psychology, business administration, or economics. Society has been traditionally willing to pay scientists and technologists for solutions. In the last half of the twentieth century, we have become increasingly aware that these scientific and technological solutions are themselves creating new social problems. Who better to turn to for solutions to social problems than social scientists? Hence we have HCST! Asking the social sciences and humanities to adopt a problem-solving orientation rather than a knowledge-building orientation and to consider "applied" research rather than (disciplinary) "pure" research is a risky venture. Some disciplines and some members of all disciplines in the social sciences and humanities will be simply unable or unwilling to contemplate such a paradigm shift. They will have good company. Many of the "hard" scientists

also disdain problem-solving applied research (e.g., the theoretical physicist who views applications of his work as belonging to engineering and not physics).

For those of us willing to make the paradigm shift, we will have a major problem to overcome, unlike our colleagues in the health professions or engineering. Applied research is quite literally the application of some knowledge base to a current problem. Finding a cure for polio depends on a knowledge based in biochemistry. Building a better bomb depends on a knowledge based in nuclear physics.

We have a very scant knowledge base about the human context for science and technology. There seems to me to be two direct implications of this limitation. The first is that we must accelerate the "knowledge-seeking" research on HCST. Secondly we must expect infrequent and unpredictable payoffs for problem-solving research in this field. We should not, therefore, generate any single unidimensional list of priorities for funding research. Instead, we must proceed on a broad-band basis building on strengths as they are discovered or emerge. (One might compare the current heavy investment of public funds in strategic research on cancer. At the present state of our knowledge, it would be foolish to set a list of priorities which said that biochemical studies should take a higher priority than genetic studies or studies of environmental pollutants.) While rejecting a unidimensional priority list, we still need to identify the multidimensional parameters that would determine the allocation of research funding for studies on HCST.

I would like to suggest that the first priority over perhaps the next five years be toward "knowledge-building" studies <u>but with a problem-solving orientation</u>. There is a two-fold purpose to this suggestion. One is that we need this knowledge if the applied research is going to pay off. Secondly we would be shaping at least some of our colleagues to a different way of conceptualizing the nature of their research. Hooker illustrates this conceptual difference nicely in his distinction between the approaches of <u>experimental</u> psychology and criminology.

Of secondary importance but perhaps requiring a greater share of the funding would be a beginning of applied research to try to find partial solutions to a few of the problems imposed by science and technology on some selected segments of our population. We may be optimistic to hope for solutions to the social problems of the technology of war (but we need to get a start on it). We might, however, have discovered ways to change the impact of violence in television on child viewers or be able to more accurately assess the social costs of building a pipeline through native people's land.

<u>A Suggested Strategy for Setting Priorities for Applied Research on HCST</u>

Kuhn has suggested that paradigm shifts are facilitated by examining analogies from different conceptual systems. I would like to suggest an analogy for the social sciences and humanities from the behavioral and health professions' strategic studies of life stresses. The analogy I would suggest is that the science and technology effects on our society are analogous to life stress effects

on individuals. Life events may be stressful at one time and not another, may be stressful to one individual and not another. Their effects are very dependent upon how they are perceived and upon the available resources the individual has for coping with them. Perhaps most insidious of all, many life stress events have initial positive or rewarding effects while their damaging effects are not perceived or experienced until years later.

In organizing strategic funding on stress research, priorities for the knowledge-building research are set along several dimensions: (1) nature of stressors, (2) perception of stressors, (3) nature of stress response, (4) stress-coping strategies and resources. Thus, there are all kinds of life stressors that one could choose to study: famine, divorce, faulty health lifestyles, neurochemical imbalances, etc. We can decide on relative priorities among these. Thus in North America at the present time, there is not a high priority put upon studying the nature of famine and a very high priority on faulty health lifestyles (such a overeating). In some Third World countries, these priorities would obviously be reversed. Similarly, we can examine the nature of stress responses and put priorities on these as well. High priority these days is given to cardiovascular responses to stress. Again, a completely independent priority dimension might be in coping strategies. It is interesting that higher priorities are being placed in this decade on social and behavioral coping strategies whereas a decade ago the research funding priorities went to biochemical coping strategies (the development of tranquilizers, etc.).

In the applied research on stress, again we have multiple dimensions to establish priorities on. These include identification of the populations at risk, identification of stress effects, and development and evaluation of interventions which make strategies and resources available to those at risk. To choose just one of these as an example, the priorities these days on stress effects place health hazards considerably above social hazards, moral or personal value hazards, or economic hazards.

I hope this analogy has not been stretched too far to suggest how we might proceed in studying the human context for science and technology. We will need studies on the nature of science and technology, how science and technology are perceived, factors that alter those perceptions, and studies on the human response to science and technology. It may be particularly important for us to document the different ways in which people cope with science and technology (particularly its adverse effects) and the resources that are available in our society for dealing with these effects. Each of these dimensions (and there are undoubtedly others) can have priorities identified, fully recognizing that the priorities will change from time to time and perhaps from region to region. In Canada, for example, we may want to place a higher priority on the technologies associated with energy resources, transportation, and communication than with space technology and nuclear physics.

We may give a higher priority to historical and cultural studies of differences in the ways that the French and English communities perceive science and technology than, for example, rural versus urban

differences in perception.

The University of Windsor may place a higher priority on studying the community effects of unemployment in the auto industry where the University of British Columbia might be more interested in the noise effects on the community from the aviation industry.

We would need some more knowledge to identify populations at risk to the adverse effects of science and technology and then develop priorities for research along this dimension. Minority groups lacking in resources, for example, might receive a higher priority than urban groups with multiple social resources. Similarly, we would need more knowledge on the identification of the hazards of science and technology. Such a list might include health hazards, economic hazards, social and cultural hazards, lifestyle hazards, moral and personal value hazards, systems hazards, human rights hazards. We might then rearrange such a list of hazards into some kind of priority system for research funding.

In summary, I would like to put forward for consideration the suggestion that we must have both knowledge-building and applied research that are problem-oriented and as much as possible integrated. To maximize the effectiveness of this venture into strategic funding, we need to have a system for identifying priorities, and I suggest that for both the knowledge-building and the applied research we have to identify multiple, relatively independent, dimension, each of which will be subject to some more or less structured ordering of priorities. We could also consider ranking the dimensions although this is not necessary. Thus, we might decide that higher priority will be given to studies dealing with identified hazards than studies dealing with identified

populations at risk. We must recognize the transitory nature of both the dimensions and the order of priorities within these dimensions; i.e., we should expect that they would differ from time to time and place to place. We will need to impose some limitations on this transitory nature by defining time horizons (perhaps setting priorities for the next three years or the next five years) and also by geographic restrictions. Traditionally in Canada, priority differences are set province by province. I would suggest for this endeavor that SSHRC consider allowing each university community to identify its own priorities. As Hooker has amply documented, research of the HCST field must cross discipline boundaries and also probably needs to cross the academic/community/business boundaries as well. Groups of scholars, scientists, technologists, and members of the community who have a common interest in some dimension(s) of knowledge-building or applied research in the HCST field could put together proposals which could be organized into priorities by that university community. These proposals could then be reviewed in terms of identified regional priorities and finally approved for funding after consideration of national priorities. (Could we hope that a federally funded granting body would permit university/community priorities or even regional priorities to prevail??)

Social Implications of Mass Access to Multi-Point Databanks and Some Suggestions for Useful Research

W.D. Godfrey

Chairman, Department of Creative Writing

University of Victoria

President, Greater Victoria Media Research Association

Abstract

The paper examines three crucial areas where computers may affect the community: artificial intelligence, robotics, and telematique. Eight approaches for widening the range of current research in science and technology are considered. A final example of "token research" in HCST illustrates the author's call for a two-track approach to the general problem: specific and arbitrary versus long-term and philosophical.

I have been asked to prepare a position paper on what an HCST group might suggest in regard to the human context of computer technology. I think that the difficulty of such a task reflects the difficulty of our more general task. I expect that I read about two hundred pages per week in this field and even that represents some careful selection and specialization. Even so, I find it difficult to consider myself as much more than an apprentice. I suspect that if any of us become too technical about our own fields then we are likely to lose many even of this carefully selected group.

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Nonetheless, generalizing, one can identify at least three major areas of impact: artificial intelligence, robotics, and telematique. Although the dislocations caused by all three are likely to be severe, there does seem to be a fortunate inverse relationship between the severity of the dislocation and the probable implementation dates.

Artificial intelligence theory appears to be circling around in a closed loop. Little has been delivered of the elaborate promises of a decade or more. The general flaw (see, for example, R. D. Schwartz, "New Directions for Artificial Intelligence")* seems to be a concentration on capturing intelligence at that point when it is most similar to the binary computer's own nature, that is, when used in balancing a check-book, playing chess, or other "figuring-out" activities. The approach has become one of adding memory and speed to the logical process rather than attempting to discover how human intelligence functions within a majority of evaluated-inputs mode of operation. I would hazard a guess that we would be wise to merely keep a watching brief on this subject for the next five years, but that special attention should be paid to Russian cybernetics with its emphasis on mastering naturally occurring control systems.

Robotics, on the other hand, is a technology that is likely to flourish during the rest of the century, causing severe economic and social dislocations. From our global perspective, this is a technology Canadians ought to welcome since it could, in theory, decentralize ownership, design, and place of manufacture for a wide array of consumer goods. In fact, of course, it is a technology which is likely to further centralize ownership and design and to be used to produce not a necessary minimum of manufactured goods for all, but more of the same excessive non-necessities for the wealthy few in the world. The flaw is not in the technology but in ourselves. The results of robotic manufacturing are likely to be increased demands on scarce resources, increased emphasis on advertising and packaging, and increased alienation among the working poor.

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*__Proceedings of Session 80.__ CIPS. May, 1980. 351-364.

ensure equal distribution of the wealth added to the economy by this labour-displacing technology and to devise new methods of guaranteeing a full sense of participation in the economic and social life of the post-robotic community. Comprehensive preliminary research in this area should begin at once.

But, in my opinion, it is telematique which ought to most concern us in the near-term. Telematique, the marriage of computer and communication technologies, is here. Most of the technology and a good many of the regulatory and social problems are outlined in Gutenberg Two. Let me just recapitulate with an example.

Instead of the somewhat chaotic and time-consuming manner in which we have gathered together in Calgary, we could, if we had begun with the resources of many a corporation, have put all these papers into a common databank, (from our offices or homes), commented individually on each of them, come up with a number of possible action models, voted on these, and thus arrived at the Calgary meeting with at least the beginning of a consensus (or cancelled the meeting knowing that all was hopeless).

Parkhill's concept of an electronic highway postulates a standard roadway to and from any terminal in the country, plus a common protocol for the storage and retrieval of data from a very large number of databanks. Even conservative projections of the technology allow us to predict the arrival of the home-databank within the decade. At the moment, there are already at least 500 public-access, commercial databanks. By 1990 there will be at least a million public-access databanks, some commercial, some governmental, some voluntary, subsidized, or co-operative. The hardware cost of establishing a good-sized databank by then, say one of a few million book pages, will be less than $20,000. One of the minor problems will be providing terms for naming databanks of different categories and sizes. One of the major technical problems will be indexing the indexes.

Information does have a few advantages, however. It can be reused without degredation; duplication is inexpensive; side-effects are generally not considered negative; the generation of information is socially productive and individually rewarding without placing excessive demands on physical resources. Any growth in this area might do a good deal to relieve the dislocations caused by further mechanization in other economic spheres.

Let me list a few targets, from a Canadian point of view:

1. Establishment of satisfactory ground-rules that would guarantee a Canadian-owned, Canadian-regulated, cost-effective, cheap-access, open-content, electronic highway.

2. Capture of a significant proportion of the manufacturing and

software-development involved.

3. Guaranteeing a level of content-input sufficient to maintain and strengthen our sense of community.

4. Development of the widest possible range of information-provider databanks: unions, universities, libraries, associations, municipalities, etc. To do this, restrictions may have to be placed on the existing media forces who are already regrouping (Star and Southam; Premier and Canadian Cable Systems) in order to maintain their existing oligopolistic position.

5. Provision of low-cost utilities as part of the information infrastructure. These would include text and graphic editors; educational authoring languages and utilities; billing facilities and standards; new regulations for copyright, libel and slander; indexing guidelines; etc.

The social problems associated with telematique can be divided, in a gross fashion, into two: displacement and alienation.

Certain groups of workers, especially those involved with traditional print media (and this includes the full range, from typesetters through office workers and librarians* to teachers) will at best find themselves undergoing a good deal of retraining and at worst find themselves just as unemployed as the production-line worker replaced by a robotic truck-painter.

My own current estimate is that even today one could purchase courseware for at least 60% of the K to 12 curriculum for less than \$20,000 and the equipment to deliver it to 32 students for another \$200,000. OISE claims to be delivering courseware at a price of less than \$1.00 per student hour. Once one can deliver the courseware to any two classroms, it becomes a trivial matter to deliver it to a hundred homes.

Consider the social implications of one possible scenario. Stanford University offers a complete university entrance training package for \$1,000 per year plus transmission costs. The parent receives a daily report on the student's progress, plus weekly summaries, evaluated against local, regional, and international norms. Local branches are established as the service moves around the world. These branches provide personal tutoring for problem areas, social and

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*For an interesting example of an intelligent librarian's use of a partial knowledge of the technology to defend the status quo, see:
"The Library and the Unwritten Word." Basil Stuart-Stubbs. The Royal Society of Canada's Symposium on The Written Word. March, 1980. Unpublished.

athletic activities, and courseware adaptation and delivery facilities.

Not only is this instruction criterion-referenced, self-paced, and entertaining, but the range of offerings is much wider than any school now offers. Thirty languages are offered, as well as enrichment levels in many fields that allow the bright student to bypass all or part of first year university courses.

I am not sure about Regina, Winnipeg or Calgary, but I would guarantee the financial success of such a service in Victoria, Vancouver, Ottawa or Toronto. And it would be, in many instances, those students most likely to encourage good teaching that would be drawn out of the public system by their parents once such alternatives became available.

In addition to the many such problems of displacement that one can forsee, there are also problems of alienation. A number of studies seem to indicate that one possible result of the information revolution may be a refusal to participate. As academics, we tend to look on the creation of large bodies of information as an ideal, as an immense library, or, at worst, as a management problem: how to best create summaries, indexes, graphs, co-relations, etc., so as to efficiently digest and circulate what has been created. There are other approaches, however, including turning it all off.

The attack by intellectuals on the mediocrity of the media during the past decades may disguise the true social function provided by newspapers, radio and television: rather than failing to live up to their stated ideal of discovering and circulating correct, current information, they may, in fact, have been quite successful in providing the general populace with exactly that patina of mis-information which it requires in order to continue to function and to keep at least one-tenth of an ear cocked towards the outside world. Without the emphasis on dress and dross, life-styles, bathos, cheesecake and scandal now provided by the mass-media, a complete disinterest might be the most common response to that information overload in which we quirky academics take some delight.

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This has not been, by any means, an exhaustive survey of the area delegated to me for comment. It does, I trust, raise what I hope will be a common problem in the other papers. Technology is now so pervasive that examination of almost any technological specialty from a humanist viewpoint leads one back to the global problems. Any specific social problem or technology blockage can be "solved" by a small group of specialists from one, or a few, disciplines. But although many scholars would agree that a wider perspective is required, few are willing to co-operate in such ventures and funding usually declines in proportion not only to the degree of humanism but also to the number of disciplines involved.

When one looks at the range of problems that fall within the purview of this group and compare that with funds likely to be made available by SSHRC, the contrast is almost comic. Italy , a minor player, is putting up 50 million to develop new computer products this year. Japan will spend billions during the decade. At best, there may be a fund of a few million to deal with all of the areas outlined in Hooker's paper.

It does not seem to me possible for us to come up with any comprehaensive suggestions. Our efforts, I feel, must begin with acceptance that the acts we generate will be token; we ought, therefore, to concentrate on selecting the best of many possible tokens. Such token research projects should: be extremely cost-effective; not duplicate other possible research: provide validation of our general approach; have high Canadian relevance; encourage other funding bodies to look carefully at the written or unwritten frameworks of their research and to extend those, whenever possible, so as to encourage more holistic research and more comprehensive results.

The failure of Canadian economic planning during the past two decades is leading us towards some fairly desperate catch-up efforts at the moment. Funding for research and development appears to be increasing at both the federal and provincial levels. NSERC does not have all the money it would like, but the rate of increase is at least encouraging. I am probably the only writer ever selected by a group of scientists to be the principal researcher for an NSERC group strategic grant application. As social commentary, I found the NSERC application forms fascinating. The efficiency of NSERC, as seen by SSHRC officials at least, is made possible in part by an arbirtary division of science into hundreds of neat sub-categories. Evaluation is thus simplified; but such simplification has its costs which are not always visible from within the structure.

If one were to think of widening the frameworks of science and technology research, in order to create some social rather than self-defined efficiency, then the ancient Chinese methodology of the eight-fold way of the Shuns might be appropriate: documentation, evaluation, participation, utilization, interaction among technologies, amelioration, distribution of benefits, and prediction.

Such factors are often squeezed out of scientific research by the very restraints that contribute to the apparent efficiency of the research: clear specific targets and a precise operations plan for reaching those targets. Any one of those factors, however, would provide a group such as ours with a starting point for widening frameworks. They should be considered as lobbying points as we attempt to shift the general research perspective.

1. Documentation.
Here, one only has to compare the material on political and economic impacts on society with that covering technological impacts to

perceive the obvious need. There are, for example, already a thousand (imported) microcomputers in Ontario schools and yet nobody at the provincial or Federal level has any idea of what is happening let alone a reasonably comprehensive short-term plan for dealing with the consequences.

2. Evaluation.

Again, with the possible exception of the NSERC strategic areas, most scientific research support in Canada is arranged on a peer-group evaluation basis. Increased provision of funds is supported by comparing the GNP percentage that goes to research in other countries with that in our own. No proper benefit and impact studies are made. What were the real results of scientific research funding during the fifties and sixties?

3. Participation.

One simple result of our token projects might by some validation for a recommendation that social evaluation be a part of all existing funding and that 5% of each research grant be added on to projects that included such a component. This alone would ensure at least a minimal awareness of a larger environment for many projects as well as an important body of data for specialists within our cross-discipline.

4. Utilization.

The NSERC strategic grants place some emphasis upon utilization of the research by existing industry. Again it is difficult to tell how much real weight is given to this factor when the allocating actually takes place. As the amount of funding which goes into scientific research increases, it would surely be useful to track this factor, especially given the domination of our industrial base by foreign-owned manufacturers. What groups, such as small business, are effectively excluded from the process?

5. Interaction among technologies.

Although the HCST group has split computers and communications, and although it is true that major advances are being made in both technologies, the real social impact will come from the interaction of the two sets of advances. A discipline-based funding mechanism tends to pass-over such interactions. Our approach should avoid such artificial constraints.

6. Amelioration.

In a few instances, the specific social improvement that might justify scientific research or investments in technology are spelled out. In most cases, however, the complexity or rareness of the problem, the short-term economic benefits, or the general advancement of science provide all the rationale required. An HCST group could do a great deal of useful research, even on an historical basis, looking at projected versus real amelioration. It could begin to develop a methodology for examining amelioration of the negative effects of coming "advancements" in science. How best, for example, to deal with workers displaced by robotic manufacturing?

7. Distribution of benefits.

This is the prime question for the area of robotics and perhaps for many other areas of technology. Is it proper, for example, that Canadian Cable companies should invest $200,000,000 in one year in America simply because they are unhappy with the restrictions placed upon them in Canada by the regulating body which grants them a very profitable monopoly on the use of one specific technology? Should there not be a public interest clause in all patent legislation?

Comparisons of Crown corporations with private firms, seem, as another example, to be now very much a hit-and-miss affair, reflecting the bias of the economists doing the research rather than any objective analysis of costs and benefits. Again, the pre-condition may be a social change; we must, as a national community, set the widest possible distributions of benefits as one of the requirements for "good" technological advance. We are quite far from such an attitude at the moment, even though we pay for a large proportion of research through government grants, tax deduction clauses, or patent fees to foreign countries. One blockage, in this instance, is the right-wing politics and bias prevailing in many of our faculties of economics and commerce. A second is the continentalism of many deputy ministers. The nature and impact of such blockages form part of a large area where taboos forbid serious research. Why do we not analyse the university itself in such terms?

8. Prediction.

Again there seems to be a mid-range gap that academics could be encouraged to fill: between the five year plans of corporations and governments, and the non-specific futurism of a McLuhan. Prediction is, of course, far more dangerous an approach than documentation or evaluation; one is too easily proven wrong. But if the university is to become more involved in the cycles of change we are likely to experience as citizens in the coming decades, then prediction is going to have to become a larger component of academic reseach than it now is. If encouraged, it will develop its own methodologies, improve with time, and encourage a cross-discipline approach.

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I do not feel that computers represent the best area for token projects of this new HCST group of researchers. However, in order to remain consistent with my theory, let me suggest a token project that might fit some of these criteria and utilize some of the eight-fold approaches I have suggested,

In association with the TELIDON research underway at DOC, the database research planned at NRC (Electrical Engineering), and the communications research designated by NSERC as a strategic area, SSHRC could extend this process of evaluation of a possible research area into an actual research project. A national, multi-site "electronic college" could be established, with perhaps 100 participating scholars and activists. No more than half of these should be based in

universities. A half million a year should provide the necessary hardware and communications links. A management group of about ten people would serve four functions: to establish and maintain the system; to approve participating sub-projects; to ensure and simplify the cross-indexing of data from the sub-projects; to measure the degree of cross-fertilization and whether or not such a system improved the "efficiency" of the research.

As the complexity of science and technology continues to develop, it seems to me that the uncertainty principle may apply to larger worlds than that of sub-atomic particles. We may learn to understand some of these new technologies only by being part of the process. Innis, of course, would say that such has ever been the case for written communication and that we must always accept such a limitation on our understanding.

Without somehow getting beyond the limits of print, at least in the area of computers and communications, it seems to me unlikely that we will be able to keep up with events, let alone analyse their impact, predict their direction, or effect their outcome. The half-life of much of the technology in this area in now two years. That is very close to the minimum time required to produce and make available a scholarly book.

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In general, I find myself in agreement with much of Hooker's paper. I think that we do have a beast to wrestle with, but I am afraid that the beast has so many heads and that we have so many possible wrestling styles to choose from that we may be able to postpone the actual bout almost indefinitely unless we come to some quite arbitrary decisions.

I would, therefore, favour a double attack. Let us attempt to define and implement a few token research projects as quickly as possible. Then we can consider them as prototyes and continue the larger philosophical debate about methods, key sectors, approaches, etc., even as the token research projects take place.

Solving all the general problems outlined or suggested in Hooker's paper represents approximately 13,789 man hours according to my special humanist-model Hewlett-Packard calculator.

May, 1980.
Victoria

OBSERVATIONS ON THE HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

The Hooker compilation of opinion expressed at the London meeting seems very comprehensive and very thoughtful. It gives the impression that the participants at that workshop were very much in touch with their respective elements of the topic. The document at first sight, however, frustrates the reader because it provided little in the way of analytical summary, but that is probably too much to expect, given all the constraints. This reader is very pleased with the term "Human context for science and technology" since it seems to be a term that is understandable. The understanding however is seriously undermined when the term is reduced to a meaningless acronym. The major weakness of the London meeting seemed to be a failure to define the topic adequately. When "human context" and "science and technology" are used together to define a field, there seems to be little that is not included, yet that was not the intent. Searching within the topic was only mildly successful in focussing on a few subtopics, but even these were frequently vague or dated. Comments about interdisciplinary were well-founded.

We have an uncomfortable feeling that we are a solution looking for a problem.

So also we have a feeling that the topic is being approached from a coldly technical point of view, that science and technology represent a non-human (if not, inhuman) source of problems and solutions. This seems to lead to a call (a) to restrict and control science and technology and (b) to manipulate and use it. Accordingly, it seems to this reader that the humanity of scientists and technologists was not considered.

Finally, the artificial dichotomy attributed to science in terms of basic and applied aspects was regretable. Thoughtful scientists have long since rejected these terms as useless and misleading.

A fundamental need that did not emerge clearly in the London meeting was the need to address the topic in terms of its humanity. If we designate art as that which artists do, painting as that which painters do (either canvas or fence), architecture as that which architects do, then surely we can say science and technology are that which scientists and technologists do. Thus we would have "The human context of <u>scientists</u> and <u>technologists</u>." In this way we could develop a useful focus within the universe of the topic "The human context of science and technology." This allows us to distinguish between the science of Langmuir's adsorption law and the humanity of Langmuir. The elegance of the physical law is thus related to the inspiration of the scientist, in a vital interplay of objective law and human intuition. Any one can paint a picture or build a building, but only the inspired person can paint a masterpiece, build a Taj Mahal or design a brilliant equation. If we lift the topic at hand to this level of discussion, the issue of control and manipulation dissolves into one of human understanding.

This leads us into a new dimension of policy formulation. Public participation, the cries for which become so strident during the last decade, is really a euphonism for "Let <u>me</u> make the decision; I do not trust <u>you</u> anymore." Surely we are not serious when we say we want to participate in every decision. But the salient point is that the decision maker (however established) must have the trust and understanding (even, respect) of the people involved. We see this need in the

functioning of scientists and technologists, just as we do in the case of artists (but they are harmless), and architects and designers (whose mistakes and bad judgements are much more costly), and in the case of political functionaries (whose mistakes and bad judgements may be disastrous!). This need for trust in scientists and technologists now has become very strong, since scientists and technologists have long since graduated from the harmless position of village idiots of two centuries ago to the powerful position of experts in modern society.

Perhaps more than linking with other studies, 'the humanity of scientists and technologists' is more appropriately recognized as basic to any and all studies dealing with control and manipulation of science and technology.

Western Canada. Scientists and technologists in western Canada are hardly different from those anywhere else, other than (a) they survive in a harsh climate, (b) they survive on the fringes of scientific civilization, and (c) those who could work elsewhere choose to work in western Canada. But like scientists and technologists anywhere else, as individual persons they are part of the local scene. With some limited loyalty to their employers, they are first and foremost members of the community. The human context of science and technology in western Canada thus includes awareness of the needs for, and consequences of, their work in that region. It is not only the social scientist who asks, for example, about the rationality of building a $50 billion pipeline to supply 7% of the American market for natural gas.

The need in western Canada in the 'human context' topic is to explore the opportunities for truly innovative research. Too often we

address problems and miss the opportunities. With the transitory wealth of the western natural resources we have about two decades to establish and conduct world-beating research in the human context. We can see the high technology of California, the insidious pressures for continentalism, the wealth of local industry and government. If the ultimate objective of society is to provide employment and consequent rewards, what is the role of scientists and technologists, not as paid lackies but intelligent members of the community? What are the opportunities? Do we drive to high technology in everything, with each new job costing $1 million in capital or do we go to low-technology where each new job costs $1000, but everyone gets a job. Or do we invent some other deployment of science and technology that provides for all the social needs in some new and innovative way?

The uniqueness of the west lies in its sparse population (per unit of resource value), its severe climate, its isolation (from markets and worldly intercourse) and a certain alienation from the rest of Canada. The alienation is partly spacial and partly political, and it pertains to science and technology in much the same way as to politics and culture. The uniqueness of science and technology in the west is the foreign domination of the major resource industries except agriculture and possibly recreation.

By way of specific research topics in the human context of science and technology, the position of scientists and technologists in the multinational context demands attention. How does a scientist function as a professional and humanist in a situation where the results of his/her work are perceived by him/her and his/her colleagues as inimicable

to the local (i.e., western) good? Given a clear answer to that question, the next question is, "How should the human system of science and technology be redesigned to accommodate the newly perceived needs?" "What role can or should the scientist play in correcting the industrial/political dominance of foreign industry in western Canada?"

This is an old, old question. It surfaced spectacularly in the days of Hiroshima and Nagasaki..."Where did the responsibility of the scientist/technologist end?" Was the answer then appropriate now?

To what extent should industrial/agricultural subsidies (incentives!) be modified through the participation of scientists and technologists?

What would be the most appropriate vehicle to invent to convey the individual or collective judgement of scientists and technologists on topics including natural resources and agriculture in western Canada? What is the role of professional societies? Is there not a better (more effective) way than leaking restricted documents? Is there not something far better than open-information laws? What form could it take?

There is the perennial question of the conflict between personal integrity and credibility of the scientist on the one hand, and the pressure (overt or perceived) of the client consumers of science and technology on the other. So also there is the question of "What is science and technology for?" "Is it TRUTH, or is it for the GOOD LIFE?" One sounds pious and the other superficial. Is it for solving problems? Is it for rationalizing and correcting and improving the present state of society? Is it for providing a service, as a vehicle by which jobs

are created and a profit earned, as in a car wash or a consulting firm? Is it an art form, for the aesthetic enjoyment of the beholder and the practitioner? Is it part of the culture, a functioning part of the social machine?

Now back to the human-context research in the west: Perhaps it would be useful to list specific questions for serious research:

- What is the role of the Canadian scientist and technologist in industries that are foreign owned and controlled?
- What is the role of the Canadian scientist and technologist in industries that are engaged only in primary-resource exploitation.
- What is the role of the Canadian scientist and technologist in promoting secondary and tertiary resource development?
- What is the role of the Canadian scientist and technologist in promoting conservation of natural resources?
- What is the role of the Canadian scientist and technologist in pioneering a wholly new pattern for agriculture in western Canada?
- What is the role of the Canadian scientist and technologist in plans for massive inter-basin transfers of surface fresh water?
- What is the role of the Canadian scientist and technologist in plans for a sweeping development of nuclear fuels?

Herewith my reaction to the report prepared by Professor Hooker on the Human Context for Science and Technology. The material is complex. I'm sometimes uncertain of my ground but there are a number of principles expressed by Professor Hooker that I would agree with.

1. an advantage of the research area is that it is interdisciplinary

2. in particular it should lead to the breaking down of barriers between science and technology on the one hand and human studies on the other

3. there is an awareness of the humanities as a potential cohesive force behind more specific research

4. there is a recognition of both understanding and action, or theory and practice, also a recommendation that both researchers and users be involved in the process

5. there is a recognition of the need to serve groups which are at present at an information disadvantage

6. the document recognizes that a value-free science, for instance, is a value system, and does examine its own ideology (i.e., its dependence on rational, scientific thought)

7. the subject matter of the HCST is obviously important

My conclusion is that Hooker's approach (and Annex II as well) is an attractive prologue to a research program in this area.

There is one of Professor Hooker's paragraphs that I would like to examine from a different point of view, and examine in terms of point 3 and the second half of point 6. It's the paragraph in Part III immediately after the first diagram and begins "Tensions can be fruitful only if they are kept in balance." From the standpoint of literary study that might be re-written "Tensions can be fruitful only if they keep falling out of balance." Ibsen described his writing as analagous

to a scorpion that injects its poison into a sponge and then feels healthy again, or balanced, but the energy for the next play presumably comes from the poison. Edmund Wilson describes this process of creation by the myth of the wound and the bow, from Sophocles' Philoctetes, and sees it as typical of the nineteenth century that the energy to create comes from a terrible imbalance, the wound, and that without that wound (that hatred, that despair, that self-loathing) there is no magic bow - the work of art. Nietzsche in The Birth of Tragedy would see Professor Hooker's ideal man as Socratic man, scientific man, who in Nietzsche's view betrayed earlier and greater modes of existence, the Appollonian and Dionysian. When he finds a balance between those forces in Greek tragedy it is an heroic balance just this side of despair, heroic because of despair. Should the researcher always be seeking to resolve tensions, not only in his research, but in order to remain a whole person? The motive for research as for literature might be hatred (of injustice) or self despair (I am worthless unless I do this work). One might wish to communicate sometimes with the passion that what one says is absolutely right (because that would be the only way to move society from a to b, or a committee from a to b, or because one has a vision of what is the truth). Literature lives close to terror. Some scientific and technological advances advance us to the edge of terror. Is research and the researcher always to be balanced, rational man? An obsessive fury might prove a good friend. Though I feel myself on the periphery of much of the discussion, being ignorant of sociological models relating science to bureaucracy or society, or relating a topic to a funding agency, I can add something in two areas, communications and my own experiences with serving on volunteer or public organizations.

Communications

The phrase "history of the impacts of science and technology on cultural images and persons" describes one of my interests. There is no mention in the Report of a structure like that of McLuhan for analyzing effects of communications technology. Susan Sontag's On Photography analyses the image of man created by a new technology - the photograph. John Berger's Ways of Seeing describes the nature of man under the influence of advertising. Mankiewicz and Swerdlow's Remote Control describes the pervasive influence of television. Anyway, there is a world of communications study that is interested in all the new messengers of our time, and how the messenger recreates the listener. ~~Is that~~ Should that be an area for research under HCST?

And what about the content the new communications technology carries? In particular from Canada's point of view the American influence is important. ~~Would~~ Should HCST be interested in the analysis of the American story? - which over and over again in the movies of the last decade pits an anarchic outsider against societies' controlling structures (the police, the legal system, a corporation, the CIA, government), and personal freedom is always the goal (Dog Day Afternoon, One Flew Over the Cuckoo's Nest, The Electric Horseman). In such stories a government funding agency or a conference of intellectuals could only be presented as comic or villainous. Or what about the role of technology in American films or TV? The disaster films are almost all about the failure of fail-safe technology. The individual hero, however, often has technology at his fingertips - the six shooter, the magnum, the automobile.

Organizations

My main conclusion here is the impossibility of implementing technological changes without fully taking politics into account.

1) I'm Chairman of the Saskatoon Public Library Board. Saskatoon, Regina, and the Provincial Library have embarked on a plan to automate catalogue and circulation services. One political advantage of the scheme is the potential to decentralize, democratize the availability of information. A small branch library with a terminal can provide the same information as a main branch, and once all three libraries are on-line then the whole system becomes visible at once to all users with terminals. Because Saskatchewan is a totally integrated library system (the only one in Canada) the special pleasure in the future, depending on hardware costs, will be to spread the service into the rural areas. That a political good brought by automation entering a particular political structure. But, I've just heard, and this is moderately confidential, that the regional librarians think the big three are taking over the system and destroying the basis of the one big library system, and a commission or a conference will have to re-examine the basis for introducing this important new technology.

2) The Meewasin Valley Authority is a structure that would, I assume, be very congenial to HCST, a body made up of four levels of government that is to oversee the health of the Saskatchewan River Valley in Saskatoon and district. It must by its nature be multi-disciplinary, take an integrative approach to the environment, which it should both help to protect and to enhance. It could be a model of how man and nature are to live together in an expanding world. It had hardly begun, however, when a group of opponents, led

by land developers but including many farmers, surfaced and undertook a ferocious campaign against the MVA, which it has responded to by drawing in its powers (which were too extensive) and boundaries very considerably. An important liberal, elite advance has been met by right-wing populism, just as in those American movies, and for a time at least the news media in the area perceived the battle in those terms.

3) My last example is the introduction of cable television into Saskatchewan, and this time I was on the side of the outsiders, the Saskatoon Cable Co-op and later CPN. A very complex story on how a new technology enters an area, and a story far more involved with politics than anything else. Out of my experiences in that struggle I would suggest some possible topics for HCST research.

Technology and the BNA Act (Communications is now a federal-provincial battleground)

Accountability of Crown Corporations (Sask Tel operates as a virtual kingdom) and how Decisions might change if there were greater or less accountability

Peer Group Pressure on the CRTC.

Anyway my experience in the politics of technology is that once the technology is there the human context for it is likely as not to be a battleground, as groups vie for power. Look at the battle over the proposed uranium refinery at Warman or the prediction that nuclear and environmental politics will be the politics of the '80's. Technology and Politics should be a central area of research for HCST.

And that's 30 for today in thought.

Cheers.

DCK/ilm

PRESIDENT
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S0G 1A0

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Liberty, Sask
S0G 3A0

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Davidson, Sask.
S0G 1A0

BACK TO THE FARM RESEARCH FOUNDATION

BOX 69, DAVIDSON, SASKATCHEWAN, CANADA S0G 1A0

PHONE (306)567-4260

BRIEF TO THE HONOURABLE EMMETT HALL, Q.C.

HEALTH SERVICES REVIEW '79

ON THE TOPIC OF "PREVENTIVE MEDICINE"

February 26, 1980

INTRODUCTION

We wish to discuss "preventive medicine" from the point of examining the perimeters of the environment the human body lives in whether at work, at home or any other activity people take part in.

We also would like to discuss the environment from which we obtain our food and water to sustain life on the planet and particularly our own country, Canada, where we have the ability to exercise control if we desire.

Internationally recognized environmentalist, Dr. Barry Commoner, in his book "The Closing Circle" estimated that eighty percent of the following illnesses are caused by pollution - cancer, cardio-vascular problems, diabetes, respiratory diseases and allergies. Dr. Samuel S. Epstein, a medical doctor who wrote "The Politics of Cancer", stated that between seventy and ninety percent of cancer in the United States is caused by environmental pollution.

To date, both federal and provincial governments have refused to relate health problems to pollution. It appears they would rather insist that the medical profession keep health costs down in our National Medical Care Program, than admit that environmental pollution is the main cause of illness in Canada at this time.

In fact, Dr. Commoner says that if we don't have environmental lean-up programs well underway by 1985, it will probably be too late and that life may not survive.

Most of our comments and questions will be about pollution from chemicals used in agricultural and industrial production, however, we would also like to spend some time on "food additives" and "noise pollution".

The National Health Survey in 1973 showed many Canadians were suffering from poor nutrition. Saskatchewan's Minister of Environment, The Honourable Ted Bowerman, told the "Water,Chemicals and your Farm Conference" at Fort Qu'Appelle on October 29, 1979, that Canadians were consuming on an average of nine pounds of "food additives" a year. We want to raise the question of how the food additives and chemical pollution in water and food effect the digestive process in humans, domestic animals and wildlife. Man is at the end of the food chain and eventually accumulates all residues that are non-bio-degradable in his tissues.

INTERNATIONAL CONCERNS ABOUT PESTICIDES IN THE ENVIRONMENT

An article in the March 23/78 issue of the Western Producer reprinted from the "Christian Science Monitor" entitled "Half million poisonings blamed on Third World pesticide use." I think if anyone gives serious thought to the article, it would convince them that we no longer cope with (if we ever could) the multitude of pesticides on the market and would quit using them. The article is as follows:

> "Pesticides, which have been a boon to farmers in developing countries, have also become a bane.
>
> At least 500,000 pesticide poisonings occur each year, according to the World Health Organization (WHO). And while no accurate breakdown exists, WHO officials stress that, among poorer nations, the poisoning rate is alarmingly high.
>
> The world uses about 4 billion pounds of insect, mite, rat and weed killer per year - about a pound for every person on earth. Industrialized nations produce about 97 percent of these products, according to the Food and Agriculture Organization (FAO) and use 80-90 percent.
>
> Many experts doubt the completeness of these numbers. But all agree that while using a small portion of the world's pesticides, poorer nations apply them intensely. Central American cotton growers, for example, spray DDT 30 to 40 times per three-month growing season. They also use the products carelessly - more than half the powder dropped from spray planes misses the target, landing on grazing land and villages.
>
> Growers are not entirely at fault. They seem caught in a treadmill. Receiving pesticide shipments during the post World War II years - often with little technical assistance and inadequate instructions - they embraced the products as a way to revitalize cash crops. But these broad-spectrum chemicals killed pest insect's natural enemies, making farmers wholly dependent on poisons for pest control. Soon even the pests developed resistance to pesticides. So farmers used more and more.
>
> The United Nations Environmental Program (UNEP) now reports that more than 300 species of insects and mites can resist chemicals that formerly destroyed them.

One result has been a resurgence of malaria. From 1973 to 1974 the number of malaria cases doubled in El Salvador alone. According to UNEP, "None of the insecticides which can safely be used for house spraying will any longer interrupt malaria for more than a few days or weeks after application." Reversing the problem will be formidable.

Industry unmonitored

The world's pesticide industries operate virtually unmonitored. In the United States, federal law allows companies to produce and export pesticides banned or not yet registered here. American companies exported more than 77 million pounds of unregistered pesticides in 1975, according to the U.S. Environmental Protection Agency (EPA).

While EPA is required to notify governments if an American pesticide is cancelled or banned, the agency seems far behind in its task. According to the Government Accounting Office, EPA failed to send out notices on 11 pesticides that were banned, some as long ago as five years.

From 1957 to 1972 U.S. foreign aid programs also sent pesticides abroad - more than $550 million worth to Africa, Asia and Latin America. Agency for International Development (AID) officials admit that even though some of these chemicals were banned in the U.S., little technical assistance was provided and instructions were sometimes in the wrong dialect.

Many of these chemicals return. In 1976 the Food and Drug Administration (FDA) found 37 violations of U.S. pesticide standards in imported poultry and meat, issuing 16 warnings to exporting countries. Following a request from Wisconsin Sen. Gaylord Nelson, in September FDA began a program of testing coffee imports for residues. So far FDA reports finding only trace amounts of pesticides in coffee."

Toxicity Test of Many Chemicals Found in Canada Unreliable

Toxicity research must be submitted by the chemical company with the application for a license to sell chemicals in Canada to the Health Protection Branch, Health and Welfare, Canada. If the toxicity research is acceptable to the Health Protection Branch, they pass the application on to the Department of Agriculture who does the actual licensing of the product.

Recently the American Environmental Protection Agency investigated the testing procedures of Industrial Biotest Laboratories and found their testing procedures were completely inadequate.

On April 5, 1978, Lorne Nystrom, MP, during the questioning of the Agriculture Estimates before the House of Commons Standing Committee on Agriculture, asked for confirmation of the findings of the American Environmental Protection Agency.

The April 13/78 issue #13, Minutes of Proceeding and Evidence of the Standing Committee on Agriculture, House of Commons, he received the following answer:

"Response to question raised by Mr. Lorne Nystrom at the meeting of the Agriculture Standing Committee on Estimates on April 5, 1978; Re: Toxicological Data - Industrial Biotest Laboratories (IBT).

" Since 1970, Industrial Biotest Laboratories (IBT) a large U.S. testing facility, has conducted approximately 4,000 toxicological studies for the pesticide industry. The studies were requirements for registration purposes and for the establishment of tolerances in Canada and worldwide. Some of these data has now been found to be defective and the remainder suspect.

To date approximately 90 pesticides have been identified by Health and Welfare Canada to be wholly or in part dependent upon IBT data in respect to tolerances established under the Food and Drugs Act. These include most of the major insecticides, fungicides and weed killers used in Canada and in the production of virtually all imported foods.

An interdepartmental Task Force (Production and Marketing and Research Branch/Agriculture Canada, and Health Protection Branch/Health and Welfare Canada) has been assembled to respond to these developments. The matter has been considered by the Federal Interdepartmental Committee on Pesticides and senior staffs of both Departments.

The actions being taken in Canada may be summarized as follows;

1. Identification of compounds supported wholly or in part by Industrial Biotest data.

2. Advising manufacturers of critical supporting IBT tests and requesting them to validate these particular studies i.e., to review raw data and records to be certain that proper conclusions have been drawn.

3. Having manufacturers submit the results of their validations to regulatory authorities in Health and Welfare and Agriculture.

4. Review of these submissions by regulatory officials.

5. Identification of deficiencies, if any, and appropriate corrective action by regulatory officials."

Federal Government Refuses to Admit Research Unreliable

It has been almost two years since the Standing Committee on Agriculture received a reply to Mr. Nystrom's question. The reply demonstrated that there is no reliable research available on the toxicity of most of the major insecticides, fungicides and week killers used in Canada and also in the production of all imported food. Almost two year. have gone by and the Federal Departments of Health, Agriculture or Environment have all failed to inform Canadian farmers or consumers about the fact there is no reliable research on the toxicity of all the agricultural chemicals used in food production in Canada. Furthermore, no research is available on the mutigenetic, carcinogenic or teratogenic (causing birth defects) effects of these dangerous chemicals.

Gigantic Amounts of Agricultural Chemicals Used In Canada

The pest control products sold in Canada in the 12 months prior to September 30/77 (latest figures available) were valued at $191,131,107, an increase of 4.7% from the revised total of $182,598,302 reported for 1976. Saskatchewan is one of the larger users in Canada. Many of the chemicals used are non-biodegradeable, so they continue to stay in the environment for a long time.

In addition, there are a great variety of growth stimulants and antibiotics used in feeding programs of livestock and poultry that may leave a residue in the meat. Customers are becoming quite concerned

.CTV's National Program "Inquiry", December 11/77, demanded a five year ban on all chemicals and drugs used in agriculture production). There are also reports of PBB's getting mixed up in the feed supplements fed to dairy cattle in the State of Michigan in 1973 which was a disaster. Cattle have also died as a result of the PCB's that is an additive in a wood preservative used on the material in corral fences.

Even with all the herbicides used, the Canadian Grain Commission reports there is a continual increase in the amount of dockage over the years. The use of pesticides over the last thirty years has not reduced the potential hazard of a major grasshopper or flea beetle infestation in western Canada.

Residues of Many Chemicals Found in Sask. Surface Waters

In November, 1978, we contacted Mr. Ken Reid, Chief of the Water Quality Branch, Federal Department of Fisheries and Environment, and he reported the following chemical residues in Saskatchewan surface waters.

PCB's

* Archlor 1248
* Archlor 1254
* Archlor 1260

Herbicides

Barban	2-4-5-T
Trifluralin	2-4-D-B
2-4-D	2-4-D-P
Picloram	

Pesticides

Lindane	Beta Endosulphan
Endrin	Dieldrin
Methoxychlor	Gamma Chlorodane
Alpha Bhc	Alpha Chlorodane
Heptachlor	* D.D.T.
Epoxide	D.D.E.
Aldrin	D.D.D.
Alpha Endosulphan	

(Chemicals marked with a * have been banned previously)

Agricultural Chemical residues in American food baskets
(No published reports on Canadian food baskets)

Journalist Anthony Decrosta in an article in the 1974 March ssue of Organic Gardening reported on the latest United States Department f Agriculture survey on chemicals in the market basket. The sampling s taken from the average two week sample diet of a 15-20 year old male n thirty American cities in four regions of the United States and is as ollows:

Pesticides in the Market Basket

Although the FDA's Market Basket Analysis is not an absolute measure of pesticide residues in foods, it does offer a general indication of levels. The 12 groups in which all foods and beverages surveyed by the Federal agency are listed below, along with the most commonly detected pesticides and their levels within each food group. Levels are given in parts per million (PPM).

Dairy Products

dieldrin, 0.005
BHC, 0.003
DDE, 0.01
heptachlor epoxide, 0.002

Meat, Fish and Poultry

DDE, 0.038
dieldrin, 0.033
DDT, 0.02
BHC, 0.007
TDE, 0.005
heptachlor epoxide, 0.004

Grains & Cereals

Malathion, 0.054

Potatoes

CIPC, 0.467
dieldrin, 0.007
DDE, 0.012

Leafy vegetables

diazinon, 0.015
parathion, 0.022
methyl parathion, 0.008

Legume vegetables

Traces of carbaryl and hexachlorobenzene (HCB)

I think the fact that many of the chemicals mentioned have been banned but are still in Saskatchewan waters, demonstrates that laboratory testing was inadequate in the first place. Testing has mainly been done in the total environment. When health hazards appeared from certain chemicals to people, wildlife or domestic animals, the chemicals were banned.

Residue Test for Soil and Food not available

There is no source that we know of that will supply information about chemical residues in soil and food on the same basis as the report of the chemical residue in the water supply listed earlier.

No research being done on the combined effects of Chemicals

Dr. W.P. McKinley, Director General of the Health Protection Branch, Health and Welfare Canada, presented a paper on "Legislation and Regulations of chemicals to the "Chemicals and Agriculture, Problems and Alternatives" Conference that was held at Fort Qu'Appelle, Saskatchewan, November 2-4, 1977.

In the question period, Elmer Laird, asked "Who is doing research on the combined effects of the dangers of the 250 chemicals that are available to farmers today for poultry, livestock and production, on people, soil and food?" Dr. McKinley said, "there are over 400 chemicals available to farmers today and no one is doing any research on the dangers of the combination of these chemicals because no one can afford this type of research." He went on to say 'only an international agency such as United Nations could afford this type of research and only if industrial nations would pool their chemical research money and give it to the United Nations."

National Research Council reports on Saskatchewan study

In 1978, the National Research Council reported on a study by Dr. Clive Dennis, Director of Occupational Health, Saskatchewan Department of Labour, in 1971, where 3,300 farmers and elevator agents were interviewed about the effects of agriculture chemicals on their health. Twenty percent reported they suffered from chemical exposure in "spraying season."

The Other Face of 2-4-D

The first comprehensive report on the dangers of phenoxy herbicides of which 2-4-D is most commonly used, was .published by the South Okanagan Environmental Coalition in 1978. They were able to finance the publication with the help of a grant from the British Columbia government employees association. This is the first time that anyone ever tried to assemble a summary of all the research that has been done on the dangers of phenoxy herbicides.

In conclusion of "The Other Face of 2-4-D", they said in part, "- - There is a considerable body of evidence which indicates that the phenoxy herbicides in general, and 2-4-D specifically, pose a substantial threat to environmental and thus human health. Laboratory research results show that test animals develop chronic problems after administration of these chemicals, It has been noted that damage results from exposure of people, wildlife and crops to 2-4-D.

Extensive research on the effects of 2-4-D on test animals indicates that the herbicides is teratogenic (causes birth defects), carcinogenic and very likely mutagenic (causes genetically transmitted defects).

These findings have resulted in authorities such as the Mrak Commission (1969) recommending the immediate restriction of three esters of 2-4-D and all the formulations of 2-4-5-T. Only the latter has been removed from general use, but it is still applied selectively in British Columbia. 2-4-D remains largely unrestricted.

Water Pollution

In the March 20, 1978 issue of McLeans magazine, reporter Julianne Labreche in an article "Please Don't Drink The Water", reports on a study by Peter Toft, Chief of Environmental Standard Division, Canada Health and Welfare.

He studied the halomenthane (chloroform) content in the water supplies in seventy municipalities in Canada. He reports the City of Regina is at the top of the list of the nine worst water problem centres in Canada. Mr. Toft says that Regina is one of the nine facing fundamental change in water treatment if we are going to accept the American Environmental Protection Agency Standards that will limit halomenthanes to 100 parts per billion.

Tests carried out on the Davidson water supply by the Buffalo Pound Water Testing Laboratory in the past two years, indicates the chloroform content at least three times as high as the Regina water supply.

Chemical test carried out on the Davidson water supply by Ken Reid, Chief of Water Quality Branch, Western and Northern Department of Fisheries and Environment show low levels of the agricultural chemicals 2-4-D, 2-4-5-T, 2-4-DP and MCPA (Davidson Leader, Nov. 2/77). Agricultural chemical pollution in surface waters is a result of the application of chemicals to drainage basins.

P.C.B.'s (Polychlorinated biphenyls)

Journalist Bill Gottlieb, in an article entitled "A and C Vitamins for a Toxified World" in the February 1980 issue of "Prevention" describes the PCB spill of 200 gallons at Billings, Montana, in 1979, as follows:

> " No one even knew the poison was there, locked away in a storage shed in Billings, Montana. But last June, it leaked - - into 19 states, Canada and Japan. And wherever it turned up, destruction followed. Half a million contaminated chickens slaughtered. Eighteen million eggs smashed.

And millions of dollars' worth of processed food quarantined by health officials until they could test it. Test it for PCB.

PCB - polychlorinated biphenyl, a unique chemical formulated in 1927 that resists destruction even by super-high temperatures or corrosive acids. A chemical that can persist in the environment for decades - - and has. It is the most widespread chemical pollutant, found everywhere from the polar ice caps to 11,000 feet under the ocean. And a chemical that, even in extremely low doses, can cause ill health - severe acne, cysts, skin discoloration, abdominal pain, nausea and loss of appetite, impotence, bloody urine and fatigue .

Industry has manufactured over one billion pounds of PCB, mainly for use as a liquid lubricant in electrical capacitors and transformers. Every year, 100 million capacitors are manufactured for air conditioners, refrigerators, television sets and other products, and each one contains PCB. Over 35 million transformers in the U.S. are filled with PCB.

One of them was in a storage shed in Billings, Montana.

It was an old transformer, out of use, and when a forklift accidentally hit, a pipe on the bottom broke. Coolant - 200 PCB-loaded gallons of it - leaked out and ran into a floor drain. That drain led to the waste water collecting system of the Pierce Packing Company, a firm manufacturing meat meal for animal feed. It's a cost-conscious firm, which <u>used</u> its waste water, gleaning it for solids, fats and grease.

They shipped two million pounds of contaminated meal. Eventually, over 1,000 companies were using or selling poisoned feed. And nobody knew. "

Mr. Gottleib went on to say the government had banned the roduction of PCB's in 1979, however, there had been a lot of exemptions; The Environmental Protection Agency has approved almost 100 percent of he requests from industry to continue using PCB (99.7%, to be exact.) "

He said: "Industry still produces PCB as a by-product in the manufacture of other chemicals, such as silicone. Then there are the junked refrigerators, air conditioners and TV sets which even if buried in landfills, will eventually leach out PCB. (There are 290 million pounds of PCB in landfills already.) Add to that the over 150 million pounds that now pollute the soil, air and water, a type of pollution that will take years to degrade and disappear.

And because all of that PCB is odorless and colorless, it has a way of sneaking up on you (and into you.) "

The article continues:

You Contain PCB

Ever lick an envelope to seal it? The adhesive could have contained PCB. Ever buy packaged food? Food wrapping sometimes contains PCB that migrates into the food. Coatings for ironing board covers can contain PCB. Certain types of carbon paper contain PCB. Some upholstery contains PCB. You contain PCB.

And Lester Crawford, Ph.D., an FDA official who helped contain the recent PCB contamination, told "Prevention" that the problem is getting worse.

"Since there is a low-level exposure to PCB all the time and since the chemical accumulates in the body, body levels of PCB will go up in the future. I would project a level of 50 ppm in human tissue. That shouldn't cause acute illness. "But, Dr. Crawford warned, "it may have a lot of chronic effects on health, effects we dont' even know about yet."

The Environmental publication "Acres, U.S.A." in their November, 1979 issue, carried an editorial commenting on a documentary film produced by Public Education Television entitled "A Plague on our Children"

It warned of the dangers of 2-4-5-T and PCB's which apparently are very close in the chemical construction. The editorial says in part:

"Dr. Barry Commoner appears in the program to say that prudence would have required Monsanto to stop manufacturing PCB 30 years ago. The proofs were in. Monsanto knew that the environment couldn't handle PCB two and three decades before Michigan became

a hot spot, and the entire nation felt the consequences. Today PCB is being found in 100% of male sperm, and nationally the viable sperm count in human males is down 30%, and all the while the company people recite their litany of innocence."

P.B.B.'s (Polybrominated biphenyls)

The September 1979 issue of the American edition of Readers Digest describes the chemical spill at St. Louis, Michigan in 1971, where Firemaster B.P.-6, a fire retardent made of the highly toxic chemical P.B.B. got mixed with animal feed. It was eventually found in 189 mills and elevators. The loss eventually totalled more than 30,000 cattle, 5,000 swine, 1.5 million chickens and many tons of dairy products.

The article goes on to report on a study carried out in January, 1977, on 1,029 Michigan farmers, chemical workers, and consumers of food from the contaminated dairy farms. The study showed that six years after the spill, 37 percent of the people had significant compaints, including liver abnormalities and neurological defects, such as memory loss, extreme fatigue, lack of co-ordination and numbness.

P.C.B.'s in Saskatchewan

We have had the PCB spill in 1976 at Federal Pioneer Ltd. in Regina which is estimated between 1,500 and 5,000 gallons or between 7.5 and 25 times the size of the Billings, Montana spill. Apparently it has not caused any damage yet, but certainly is a potential threat to Regina's water supply.

In addition, the report of the Water Quality Branch, Federal Department of Fisheries and Environment, shows that in 1978, three types of PCB's are regularly found in Saskatchewan surface waters.

Cancer Costs and Savings

We attempted to find the patient treatment cost for cancer in both Saskatchewan and Canada. We were unable to get either figure, but we did find out that it cost $6,200,000 to operate the two cancer clinics in the province. Now if Dr. Epstein is right about environmental pollution being the cause of 70 to 90 percent of the cancer in the province, then in a hypothetical case, that means cancer clinic costs would drop about 75% or $4,600,000. This figure does not cover the cost of hospital beds or

time lost from work and time donated by friends and relatives. We know that it is a hypothetical case because you can't remove the environmental pollution overnight. However, it might be done in ten years.

Allergies

The Allergy Organization estimates that 20% of the people in Saskatchewan have allergies, not all are from environmental pollution, however, there appears to be a very definite relationship.

Respiratory Diseases

Workers in asbestos mines carry asbestos fibres home with them from work if they don't shower and change clothes. However, the farmer is at home most of the time when he is spraying agricultural chemicals. When spraying season starts, which is early spring and it continues through the summer, the farmers' family is directly exposed to chemical drift in many instances. In the grasshopper outbreak in 1975 when the diluted nerve gas Furdan was used, one woman was hospitalized from her exposure while driving a school bus past the farmer who was spraying in the field. Grain dust is also a problem with about 20% of the farmers and grain buyer- in the province.

Acid Rain

Sulphur dioxide from industrial plants coming down with rain causes what has become known as acid rain. It is estimated by various sources that 5,000 lakes in eastern Canada are "dead". A recent CBC program reported acid rain in northern Alberta. It is estimated the sulphur in the soil caused the crop yield to drop 3 to 5 bushels to the acre in the Peace River district. It is also causing problems with dairy herds. There is little doubt if it continues it will destroy the productivity of lakes in northern Alberta and Saskatchewan as it has the eastern lakes.

No Grain Testing for Pesticides in domestic grain (Canadian consumptio

Mr. Tom Nowicki, head of the Pesticide Section, Grain Research Laboratory, Canadian Grain Commission, told delegates at the "Water, Chemicals and your Farm" Conference at Fort Qu'Appelle, Saskatchewan, on October 30/79, that about two hundred cars of export grain a year are tested for pesticides. It cost about $200 a car. Grain used for human consumption in Canada is not tested by their lab. He thought public health tested it. If grain is contaminated, it is rejected for human consumption. It is not destroyed - it is sold to feedmills and diluted.

Conclusion 1

Our lakes and rivers are polluted. Most Canadians rely on surface water for drinking and cooking. The air and soil are polluted with dangerous chemicals. It becomes more difficult for people and wildlife to maintain an acceptable standard of health. Life on this planet is threatened by pollution. Many people who have low tolerances to environmental pollution are having problems now. Health problems will multiply as pollution increases. We can no longer afford the tunnel vision that permits us to look at health costs separately from environmental pollution. We must relate the two.

Conclusion 2

We have demonstrated the fact that there isn't any reliable research on the safety of most of the agricultural chemicals used in Canada. We have also demonstrated that the Michigan PBB spill and the Montana PCB spill would very likely never happened if workers had realized the dangerous substances they were working with.

The Regina spill would not have been covered up if workers and management at Federal Pioneer understood how dangerous the chemicals were they were working with. We think the only solution is to clean up the environment and we make the following recommendations.

RECOMMENDATIONS

1. Recommend the federal government relate health costs to environmental pollution.

2. Recommend a temporary ban on the use of agricultural chemicals until chemical companies produce research to guarantee the safety of their use on people, soil and food.

3. The federal department of health should carry out research on the effects of chemical pollution and food additives on the nutritional value of food.

4. Adequate research grants should be made available to find out the relationship of environmental pollution to cancer, allergies, diabetes, cardio-vascular and respiratory problems.

5. Research should be carried out to find the relationship between junk food and crime.

6. Food additives and preservatives should be clearly identified on all menu items in fast food outlets.

7. Grants should be made available to assist Dr. Feingold groups and other organizations that are working to solve the problems of hyperactive children.

8. Identify and mark as quickly as possible all chemicals about the possible dangers of i)toxicity ii) carcinogenic effects iii) teratogenic (causes birth defects) iv) mutagenic (causes genetically transmitted effects) on people, domestic animals, wildlife and fish.

9. The federal Department of Health should make sure all Canadian produced and imported food should be adequately tested for insecticide and herbicide residues. The results of tests should be published monthly by 'paid for ads' if necessary, so all consumers will know what is happening to their food.

10. Tobacco advertising is banned by the Federal Government. Junk food advertising should also be banned.

11. Testing laboratories should be set up in all trading centres so both farmers and consumers can test their food, soil and water, to determine the amount of chemical pollution.

THE UNIVERSITY OF WINNIPEG
WINNIPEG, CANADA R3B 2E9

May 13, 1980

M E M O R A N D U M

TO: Frank Tester, Western Regional Co-ordinator, HCST

FROM: Carl Ridd, Associate Professor of Religious Studies

RE: Kananaskis Conference of HCST, May 22-24, 1980

I was not aware of HCST until Arthur Schafer spoke with me on the telephone about 6 weeks ago, and I agreed to come to Kananaskis May 22. Through a mixup, material for the conference--which was, I understand, sent to me--was returned undelivered; so all I have received is Frank Tester's letter and Cliff Hooker's paper, and these only a little over a week ago. They came during the final press of the university year, and it is only in the last 2-3 days that I have been able to turn to them.

Though I am concerned for many of the issues that led to the creation of HCST, and have spent some time reflecting on them over the past few years, the particular language and vision which participants at London (November, 1979) obviously came to share, and which occurs in Hooker's paper, were in some degree new to me.

Therefore, in view of the extreme shortness of time (I am already--inevitably--past deadline) and this acknowledged unfamiliarity, I will make only a few observations. They may seem beside the mark, to some with more background. They may be naive or erroneous. But I offer them as the best I can offer in the circumstances, in the hope that they may be useful.

1. Hooker's paper is an excellent piece of work even though he did it under severe constraints of time. The opening page of Part II (problems faced by society, and the social institutionalization of science), the discussion of the 3 factors that constitute the "uniquely complex and intensely self-reflexive situation" of our present, the "Beaufort" illustration (2nd page of Part III), the six themes for research, and the marvellous conceptualization of the HCST area in 3 levels (Annex I), especially the brilliant summation in the 2 concluding paragraphs of the Annex ("I diagnose our Western historical legacy . . . . quality of the result")--these were particularly useful sections to me as a new participant.

2. The field is immense--being, in principle, everything. Therefore we shouldn't worry unduly about schematizing it. If at this early stage we get unduly caught up in methodological, systemic and theoretical discussions, we will spend more time, energy and money than the effort is worth; and we will accomplish little. (I say this as one who has a great respect for such questions, and who has taught a graduate course in method and theory the past 2 years.) The Canadian genius (as against the American) has been rather to discern relations than to elaborate theories and ideologies, and I think we should continue that practice, on the whole, in this matter. Hooker's paper (reflecting the preceding conference, I take it) shows a rather greater preoccupation with theoretical questions about the nature of the field than I think healthy or useful at this stage. I am not complaining about his setting it out with such theoretical completeness; only suggesting that its priority for actual research now is relatively low.

3. The items presented in some detail seemed arbitrary. E.g., biomedical questions are of undisputed importance and difficulty; but so are the ramified questions of urban-suburban life (transportation, housing, education, etc.). Why is the former given treatment and the latter not? We need to give some thought to which questions are the most urgent.

4. I keep getting afraid, reading the paper, that we are in danger of losing track of what we are doing. We are trying to ask such questions as, "What is it to be a self in community with other selves?" "What is 'happiness'?" "What is the common wealth?" But the social science terminology yanks us away from such ultimate, and humane, questions, into questions of manipulation, intellectual (or political) control, and so on. It yanks us away prematurely. Language is not just instrumental, it is ontological, world-creating. I find the fundamental philosophical, religious--human--questions given too short shrift. We will end in liberal contractualism, with its unconscious blessing of the Zeitgeist--in our social responses if not in our technological--unless we have got firmly and right what we take to be a bona fide and durable "human context."

"Fundamental and Pressing Research Needs and Directions":

1. theoretical (in spite of caveat above); to describe the field and thus open it to the entire intellectual community for research, description and prescription.

2. I accept the 5 "Malthusian dilemmas" posed by Knelman/Hooker as a good description of the major problems. To these I would add the scientific-social-human problem of "the city." Obviously, all these problems overlap.

3. Jackson's description of the problems relating to the social institutionalization of science on that same page describe, for me so far, the second-level dimension of our problematic. These too need attention.

4. This description of the field (the 3 enumerations just above) thus opens it to the intellectual community at large--to those who define themselves as sharing these "interests" (in Hooker's sense of the term). It makes the field visible as "field," and invites others to take leadership as their interests suggest. But I think it would be useful, at the same time as our planning group thus divests itself of "control," to retain identity and to conduct a "sample inquiry" into one relatively small question: trying to move at all 3 levels (Annex I) at the same time, with respect to the particular question or problem chosen. The actual choice of problem would depend on the collective expertise we have among us; but the "Beaufort Sea" question might be it, since Hooker has given us so good a start on its ramifications. The idea would be to conduct a kind of "laboratory experiment" not just on how to do what we envisage, but on the actual doing of it--right down to advice to SSHRC and/or government on technological, economic, political actions that reflect, adequately in our opinion, the human context(s) of "Beaufort Sea." We would reflect, concurrently and subsequently, on our own experience in this matter: become our own "experiment," so to speak.

5. A further "fundamental" and pressing research need" is: how do we quantify "values"? At what point does it become "worth it" (or necessary) to compromise with desiderata? Are some "desiderata" not desiderata but essentials, which cannot be compromised; and how do we know? We need some historical investigation on this of a very specific sort--a few finite and "finished" case studies, conducted at the "triple level" of Annex I.

6. I am moved by ~~the~~ fact that HCST is formed with the specific intention that research in the HCST field should be not merely theoretical, but practical and productive (to use Aristotle's terms). Hooker's paper reminds us in several places that our research should be "anticipative, rather than simply reactive" (first page of Part IV), that we should be predictive and prescriptive, that the SSHRC is deliberately setting us up to be so ("strategic" and "directed"). I think we should aim to be practical and productive, not just in terms of research achieved (which could merely illustrate the ivory tower syndrome once again), but in terms of advocacy and accomplishment in public policy. I say this in full knowledge that research itself is action, and highly practical action too, for many of us; and in the knowledge that some distancing from policy matters is essential for the academic life. But I take it that the HCST field, if it becomes merely another area for granting and

research, will be seen by us all as a failure: that we intend by it, rather, a pressing of the university right up against the limits of its traditional detachment, and perhaps beyond them, for society's sake.

Relation to Current Issues in Western Canada (a rag bag of issues):

1. Natural gas and oil pipelines. Momentum already established, before "human context" analysis, by exports to U.S.A. and "prebuilding."

2. Garrison Water Project (N. Dakota) and its effect on Hudson Bay drainage basin.

3. Nuclear generation and disposal.

4. Transport of dangerous chemicals.

5. Rail relocation in major W. Canada cities.

6. Elimination of "externalities" that artificially render profitable such things as land speculation, auto and truck transport, water and air pollution.

CR/nl

MARTIN SAMOILOFF

COMMENTS ON "THE HUMAN CONTEXT OF SCIENCE AND TECHNOLOGY"

Having read and read and reread Professor Hooker's report I have become progressively more impressed with the development and logic of his report. At the same time I have a visceral response that leaves me somewhat skeptical. As a biologist, I have often found it difficult to express the objectives and assumptions of my own field of research interest to chemists, physicists and even other biologists with whom I have a working relationship. This inability to cross communicate is not unique to my discipline as I find many of my colleagues in diverse areas such as mathematics, earth sciences, and biological sciences have similar difficulties in communicating their sciences to other members of the science community. With these difficulties in mind I consider that there are three distinct aspects to the HCST discipline.

The first of these is the study of science as a process. This aspect includes such well defined areas as the history and philosophy of science as well as such tenuous areas as science policy, science education and personal motivation as manifested by those who pursue the activity of science. I would title this aspect of the HCST area as science as a human activity. From this definition it is obvious that this aspect of HCST falls very much within the exclusive domain of the social sciences and humanities.

The second aspect of the HCST area could be termed science and technology of human activity. This aspect is primarily within the domain of the social sciences examining the social implications of scientific and technological advance to the present. This area would examine the social and humanistic effects of science and technology in contemporary society focusing on the Canadian context.

The third aspect would examine the future impact of scientific and technological advance on human activity. In my judgement, given the present structure of research in science and the social sciences and humanities comprehensive study of this area is next to impossible. It is not sufficient for an individual to be well versed in the social sciences or sciences only, to be able to truly examine this area. But rather one would require workers with extensive background in the social sciences and humanities who would be willing to learn in-depth the most current conceptual and methodological developments in specific areas in science or engineering, or conversely a person with such comprehensive knowledge in the subdiscipline of science or engineering who would be willing to learn the complexities of some aspect of the social sciences and humanities. What I am arguing is that within our present educational structure there are few, if any, individuals capable of entering this area and I certainly am not one of them. Perhaps part of the funding thrust for the HCST programme should be for the support of individuals with post-graduate degrees in the sciences to continue post-graduate studies in one of the subdisciplines of the social sciences or humanities, or to support individuals with post-graduate degrees in one area of social science or humanities to receive training in and participate in advanced research in one of the subdisciplines of the sciences or engineering.

Perhaps I can given an example. One aspect of my own research has been the determination of frequency of induced mutation by environmental contaminants using a simple laboratory animal. Testing a number of common environmental or occupational contaminants has demonstrated that many of these agents produce mutations in a predictable dose dependent fashion. Since the mechanisms of

mutation are considered to be universal insofar as they are lesions of the DNA molecule one can readily extrapolate from laboratory data to predict risk to man following exposure to these agents. In all cases the rates of mutation are extremely low, with a very potent mutagen causing about one mutation per 10,000 genes. My laboratory and numerous other laboratories are generating a great deal of data presenting the dose dependent mutation rates of many of the common occupational mutagens. What is being done with this data in terms of implementation in a social context varies from situation to situation. In some cases an absolute ban of the use of a particular chemical will occur as a result of an over-reaction to the threat of mutagenesis. In other cases "safe levels" are established in which, somewhat cynically, there is a trade-off between health risk and economic gain to the experienced workers. In still other cases mutagenecity data is totally ignored. There have been few, if any, real analyses of the real risks and impact in economic, public health, psychological or long term biological implications of such policies.

In my judgement the HCST area must stimulate both communication and cross discipline education before the real importance and potential of this area is realized.

M. R. Samoiloff
Professor

MRS:bed

VERE SCOTT

A submission to the Western Regional Group discussing the Human Context of Science and Technology strategic grants proposal, Social Sciences and Humanities Research Council,

The situation I describe here is one which I perceive to be limiting really critical awareness of man/nature relationships and hence the diversity of alternative scientific and technological investigations which is brought to bear on the issues involved.

The inordinate attention given to manipulation of nature for man's currently perceived best economic ends is by no means restricted ~~of course~~, to the applied science of wildlife management from which I draw this example. The situation which exists in agriculture research in government, university and private industry - the prevailing bias toward industrial, energy - intensive, fossil-fuel-based agribusiness - is even more significant in today's society. In agriculture, as in wildlife management, only lip service is given toward a holistic, ecosystem approach. The bioeconomics, managerial ethos is at the root of both these fields of activity.

Sport hunting and sport fishing which have preoccupied the wildlife management community since its beginning reflect, ironically, but not unexpectedly, values which fit very nicely with the consumer ethic of our society. "Conservation" in the sense in which game biologists and sport hunting and fishing groups use it means something very different from the sense in which GAMMA report uses it. Thus, there is no conflict between recreational killing and "true" conservation in the minds of game biologists and their sport hunting and fishing clientele. They share the same values and world view.

The organization "Ducks Unlimited" (an ironic name for a conservation group) is perhaps one of the best illustrations of this meshing or fitting of a conception of "conservation" with the prevalent consumer values of our society. Ducks Unlimited's board of directors reads like a "Who's who" in the Canadian establishment, peopled as it is by lawyers, politicians and bureaucrats who share a common ethic and attitude toward nature. The existance of organizations like Ducks Unlimited seems to me to legitimate our society's manipulative, economic view of nature. The very people who sit on D. U.'s board are among the people who control and are benefitting from the destruction and alteration of the habitat which D.U. is presumably committed to preserve and create; 10 steps backward for one very small but ostentatious and very well-publicized step forward. Ducks Unlimited is seen to be "doing something" for wildlife by a very uncritical public.

Other, potentially less managerially biased wildlife/nature-type organizations (I hate to call them conservation groups in the Conserver Society sense because they, like the sport hunters and fishermen largely perceive conservation in the traditional sense) such as the U.S. National Audubon Society and the Canadian Nature Federation and its provincial naturalist club affiliations, by bowing to the weight and political clout of these consumer-oriented "conservation" groups and not seriously or with any resolved continuity, questioning the basic values, assumptions and attitudes with which these others, or even themselves, operate, serve further to legitimate the economic, managerial ethos. By so acquiescing they miss an educational and socially useful opportunity to stimulate dialectical thought on the issue.

Ecology is today viewed by most scientists as "nature's economy" (For an excellent and provocative account of how this current paradigm came to be see Donald Worster's book "Nature's Economy" - an excellent intellectual history of ecology). What cultural impact is this view of nature having on society and man's relationship with nature - this extension of economics to the whole world of life?

I believe that the values which encourage the present sorts of research in wildlife management should be seriously questioned and alternatives entertained.

A synonym for the word "steward" (a word oft-used by "conservationists" when referring to man's ideal role in nature) is "manager". It is just this mechanistic, bioeconomics view with its built-in bias toward a management ethos - a controlled environment serving the best interests of human economy - which, I believe, gives rise to many of our most fundamental environmental and social problems.

There is an unhealthy unanimity of opinion in the wildlife/fisheries research/management community as to the fundamental tenets and directions which their activities should take. There is no serious consideration of alternative approaches to man/nature interactions.

The wildlife management establishment always tries (and very successfully too) to shift the focus of its critics and dissidents away from the human value content of their discipline. They would prefer the public to believe that the deliberations in the science of ecology and its application in wildlife and fisheries management is largely value-free and politically neutral. In fact, the human value content of ecology is what makes ecology such a messy science. It is not a hard science as some of the physical sciences were once believed to be (until they got around to looking inside the ultimate particles). It is ecology with its interrelationships with virtually everything which holds out hope for a more humanistic approach to science.

The wildlife management establishment wish society to look instead at what they, the experts, perceive as the "real" issue - environmental degradation as distinct from the values and assumptions underlying wildlife management. The experts fail, in my mind, to perceive the intimate connection - the common root - between the practice, or activity of sport hunting and fishing, the managerial ethos of wildlife management and our environmental problems. At base, it is this world view of nature of western industrial man which is the problem.

The wildlife management establishment clings quite tenaciously to the belief that sport hunting and fishing have negligible detrimental effect on the populations of the animals concerned. To question this belief amounts to heresy. Commercial hunting and poaching they do not condone but say that sport hunting and fishing are not "commercial" and therefore (?) apparently are harmless if regulated properly - and their discipline has the ability to so reguate this "harvest" of the "resource". Their faith in game management principles approaches religiosity. It permits them to rationalize, justify and continue recreational killing with a clear conscience that it is fully an ecologically sound activity.

Sport hunters, their associations and game biologists (whether in the civil service, university or private industry) get along remarkably well. To be sure there are differences of opinion between these two groups (the consumers and managers are often one and the same people) but these differences center mostly on matters of degree or fine-tuning of existing practices and directions. These differences often have the appearence of having been manufactured in a not artless effort to demonstrate to the general public looking on that, yes, there is a healthy tension of disagreement among the two groups and yes, the hunters and fishermens associations keep a close and critical eye on the game biologists activities and while they respect the biologists expertise, the hunters are there to make sure that "the resource" is not subjected to improper or unwise management. "Look", the two groups seem to be saying, "in fact, no one is being kept, no one is in anyone else's pocket". In their turn, the game biologists stroke the the sport hunters and fishermen at least once a year at the ritual meeting meeting of government with "conservation" groups. There is, however, no disagreement in the fundamental managerial ethos which they both share.

There is, among a few scientists, a recognition of the lack of a needed diversity of opinion, values and world views among those of them who do research affecting other forms of life and nature generally. For example, a Scientists Center for Animal Welfare has been established in Washington, D.C.. It is a group of scientists who are focussing on three basic issues: wildlife management, factory farming and the use of animals for research. Very few scientists are involved in animal welfare concerns; many of them are embarrassed by those of them who are. It is a tremendous closet subject for people are afraid to get involved with because, apparently, once one starts empathizing with animals there does not seem to be anywhere to draw the line. Nonetheless, the formation of this center (see Science, 6 October 1978) is a clear sign that treatment of animals is increasingly being seen as involving serious scientific and philosophical as well as humane issues. Empathy with animals and with other forms of nonhuman nature need not mean anthropomorphism (as critics may deride it), but rather a replacement of 'macho-dominionism' (with its assumption that humans have absolute right of access to nonhuman beings, communities and ecosystems for human purposes of whatever kind) with the recognition that nonhuman life also has rights.

Now a few thoughts on some different topics.

The goal of the process of strategic/directed funding in HCST research should be to ensure that Canada, to the extent that it is possible, fashion its environmental and social research so that it results in effective action to have an economically and socially just society, both within its boundaries and internationally; Canada should strive to become self-sufficient in food and in other resources while remaining flexible and its economic relations diverse enough to maintain a globally ethical integration with the world economy.

HCST research should focus on seriously questioning the role of economic growth and profits in the welfare of Canada's and the world's economies. This is one of the fundamental issues which shape Canadian political life. There is a lack of both political will and appropriate institutions to take action on any proposed alternatives. The goals just mentioned in this and the previous paragraphs would lead Canada to select very different criteria for its research and action than those which currently exist.

Top priority in HCST research should be given to broad concerns with the physical and social limits to western development patterns - its cultural impact both at home and abroad; priority should be given also toconcern for the healthy functioning of natural ecosystems and biological stability generally on this planet. If these concerns are paramount, all the other concerns listed will "fall into place". The social benefits of healthy ecosystem functioning, even if humans cannot measure them satisfactorily must be recognized and given far more weight in economic studies than they have been given to date.

Vere H. Scott
342 Baltimore Road
Winnipeg, Manitoba
R3L 1J3

May, 1980

Phone 453-6020

Items for the definition of research priorities for the Human Context for Science and Technology

1. Communications/Inter - disciplinary Linkages

Many issues of research and policy today are inter-disciplinary in nature (e.g. social impact analysis, criminology, community planning). Yet these areas benefit from many traditional disciplines for concepts and methodology. A "clearing house" function is badly needed.

2. Scope of Investigations

Inquiry in the area of the social sciences using hard scientific method has not tended to yield the objectively useful results which one finds in the more scientific areas. Perhaps what is needed is an ever-increasing pressure on the issues, using techniques now current. Perhaps we could benefit more from a consideration of our understanding of the issues (ie how we "know" them, and the assumptions we allow and disallow). In any case, there is a need for keeping the area of philosophical and conceptual work as wide as possible.

3. Practicality

The other side of point 2 is the need for the inclusion of research oriented toward providing results which can be practically applied in a policy formulation or field situation. Whether of not we are satisfied with the philosophical basis of social science, we are nevertheless required by the

enormity of our scientific technical capabilities, to deal with their relation to the human context, both as interested observers and practitioners. Research sponsored under this umbrella should provide for the possibility immediately useful results as well as theoretical progress.

Pat Sloan

MONTREAL REPORT

BACKGROUND PAPERS

Prepared for the Montreal Colloquium of HCST

University of Montreal

October 10-11, 1980

Harvey Mitchell, U.B.C.

There is a real danger that the perspectives which we are bringing to bear on the relations between science, technology and human values are themselves determined by an unquestioning belief in technical answers to non-technical questions. How can we avoid this snare? Many of the previous discussants appear to have given their attention to the discrete problems seen as the consequence of some putative or real scientific or technological innovation, procedure, or application. The premise is that man has something called science and technology, that he uses them without knowing their consequences, and that to know why we must pay attention to their visible and perceptible results. Presumably, therefore, further study of the consequences, study that confines itself to the manifestations of unease, discomfort, imbalance, and so on, will tell us how to eliminate or at least mitigate them. There is little attention given in the submissions to erecting one or more theoretical frameworks in which to carry out such studies. One or two submissions come close to proposing that as a valuable approach; most genuflect in that direction, but blithely proceed to urge attention to the solution of small-scale problems, insisting that the large sweep or great theory will emerge from the prior commitment to empirically-based studies. Or else there is a ritualized posture of support for interdisciplinarity, which, as an ideal, cannot be faulted, but much of it is badly conceived and rhetorically stated.

The residues of science and technology cannot be understood unless some real questions are asked. These must necessarily be embedded in a historical perspective, with a firm founding or link with moral philosophy, political economy, and the goals of politics, which would comprehend the ways in which science and technology and the community at large are involved in the political process. Unless such a view is held firmly in one's mind, there will be no end to the growing popularity of such colloqouia as we are having, and no end to the non-solutions or pseudo-solutions which they are generating.

Such a programme may appear Utopian, especially in a period when very concrete problems demand attention. Perhaps. The Utopian tradition has been denounced in the past and the denunciations came faster and more furiously as science and technology made their claims and won more room for themselves. One does not need to embrace a Utopian position to recognize that it is necessary to go part of the way to an all-embracing approach, before we can be minimally certain that we can begin to have some control over what is happening and why we are letting it happen. For that reason, I believe that studies of the political process, taking into account the processes by means of which bureaucracies and liberal polities make use of and are used by science and technology, are required. This must be done for the past as well as the present; for societies in Europe as well as in Canada. The problems are older than the Canadian experience.

Second, encouragement ought to be given to students in the history, philosophy and sociology of science, technology and medicine, who have breached the privileged epistemologies of these subjects, who deny them the status of autonomously-created entities. Studies of this nature might permit us to see on what grounds, besides

the putatively independent scientificity of certain branches of knowledge, practitioners who came to be called scientists, and somewhat later, others who called themselves technicians, and others, including scientific doctors, achieved such status. This does not presuppose that what they state they are doing does not have special or unique features justifying the boundaries which distinguish them from other activities and other kinds of knowledge. It means primarily and very significantly that we might be allowed a glimpse of how that happens. The demystification of science, technology and medicine and its practitioners would serve to humanize them, to see their powers in non-Herculean ways, and might perhaps also lead to their self-demystification. In turn, they might be able to deal more openly with why and how they see themselves as scientists and technologists etc., that is to say, what might be callled the psychology or moral psychology of science; the ways in which they conduct their work in their workplaces; the ways in which they are seen as performing that work by others in the community; the ways in which both the first groups and the second group can devise methods to break the illusion that there is a special arrangement between the first groups and the rest of us in our political and other lives, namely, that science is neutral; politics is partisan; that the first is pure and only subject to distortion by the second. What must be acknowledged is that the first have their own politics, whether in the actual political arena, but also because of their commitment to their endeavours, that is, the value they give to their activities. Then it might be possible to see why they are prepared to make decisions that are political in the sense of urging those with political power to adopt certain policies on the grounds that they will benefit society, but which may not always be the case. By the same token, as the Swedish scholar, Aant Elzinga has put it, when referring to the activities of scientists who advised the Swedish government on atomic policies, "... in the absence of political consciousness scientists actually can fall for astrological and other mystical conceptions which are incompatible with the outlook of modern science (sic) of nature." Elzinga points out the dangers of a putative neutralist ideal of science leading to irrationalism on the one hand, or naive positivism on the other. In his discussion of the Nazi period in Sweden, he is also saying that scientists under the guise of neutrality were ready to accommodate themselves to an authoritarian regime. Perhaps it is the combination of positivism and the neutralist view of science -- more accurately, of course, positivism encourages that view of science -- that makes the fall into authoritarianism easier. But since this has not happened everywhere, because political regimes and traditions vary, attention should be given to the variations in political practices and the attitudes of scientists to these questions in different societies.

Allow me to summarize some of these points, and to introduce others. First, I think it would be a pity if, in trying to deal with the problems we see as emerging from science and technology, we view them as having come down to us in a non-historical, mechanical way. That position lends itself easily to the unexamined preference expressed by so many of the participants in the previous colloquia for interdisciplinarity, which I failed to see adequately defined or developed. I believe the high esteem in which it is held as an academic ideal is well intentioned, but dangerously misleading if left in its present pristine state of uncontaminated premise. We will have technique instead of critique; and we require critique to deal with the problems before us. This leads me to the second point, and that is the importance of seeing the interrelationship between science, technology, and politics as a means of understanding each of them separately, instead of seeing them falsely as separate entities which somehow are brought together when societies see themselves in crisis.

I should like to say more about the second point. There should be a way to discuss once again notions of justice and excellence as ideals to be achieved within politics, and not outside it. It may be, however, as many urge, that our only source is to preserve our self-esteem and integrity in our private lives and to continue to entrench ourselves there while heaping contempt and ridicule upon those who engage in politics for their self-aggrandizement. If we do that, we will continue to fragment our experience into moral, political, and scientific parts, believing that they can be kept apart. That is what began to happen, although with the best of intentions, during the 18th century, perhaps earlier. I should make it clear that when I speak of politics, I am not equating it with the state. I recognize that there must be a distinction between society and the state, and that politics, if understood in a Habermasian way, ensures that the two are kept apart. Politics then becomes the only way in which the moral private self and the moral public self can come together with the enterprise of expanding the knowledge of the self.

My other points will be introduced in no order of priority. From what I have just said, it seems to me that Sartre's paradox wherein man wishes to know what he is and yet cannot fulfil the wish, because he cannot be simultaneously an object and a consciousness, raises the question of subjectivity and objectivity to which many participants have made some allusions, without further elaboration. What I do recall is an easily assumed dichotomy between the two and equivalences found for each in supposed qualitative (read Humanities) kinds of studies and quantitative (read Scientific) kinds of studies.

Again, if some of the previous participants are serious in their recommendations, what we end up with is a situation in which boundaries are erected between two kinds of studies, boundaries which find their justification from the belief in the necessity of drawing a rigid line between reason and emotion, or science and non-science. That belief, I want to be quick to add, cannot be overcome by making a plea for interdisciplinarity. I don't rule that out as a later development, that is, after, as I declared earlier, we are able to develop a true critique of our situation.

That path can be cleared, then, it seems to me, by -- and I am the first to concede that I am engaging in my own metaphysics, or at least, setting them up in the belief that they are a more satisfactory metaphysics than some of the others I have seen -- paying heed to studies of human nature, and, in the present instance, asking what we mean by human values. The previous discussants took it for granted, as I recall, that human values were either crudely or precisely related to or the equivalent of humanistic values. I think that that assumption has seriously to be questioned. Human values, at least for some, may turn out to be anti-humanist. One has only to bring to mind various models or images of man to know this. In recent versions or descriptions, men can be cultural dopes or psychic robots, plastic or autonomous, structurally determined or self-determining and self-acting. All such questions must be grist for further research mills. Knowing what we value and valuing what we know are not at all obvious questions. A metaphysical a prioristic position that values autonomous man will probably be sympathetic to research that eschews objectivism in its extreme form. Such research would not leave out of account questions of subjective perception, emotion, and will, since they are the most immediate ways in which action or acting can be conceived, even while we recognize that a lot of very difficult and disciplined ways of thinking lie behind them. If, on the contrary, such a vision of man is negated, other kinds of inquiries will be

encouraged, especially studies in the social sciences which take as their model both the natural and biological sciences, but especially the latter.

Two thoughts on the latter question. First is that the natural and social sciences should not be thought of as existing in a superior/inferior, older/newer relationship. They are as old as each other. Second, that the reason for their separation stems from, as Toulmin argues, the fear of the first that their investigations would be caught up in relativism at a time in the 18th century when anthropological studies were bringing to scholarly notice differences in human cultures. In reaction, the moral and the future biological sciences began to take as their models the natural sciences.

What conclusions may be drawn from this? First, that "scientism" is one of the consequences of this development, though it has other roots as well. Second, that while biology and sociology have benefited from each other -- here is a good case for the desirability of interdisciplinary research, since "in human evolution... the social structure is part of the environment that determines whether a given mutation will be beneficial or harmful. At another level the biological components of language, intelligence or mental illness are by now well documented... " Jon Elster, from whom I am quoting this passage, continues: "My argument is directed only at the transfer of whole explanatory paradigms; at the appeal to intentions in biology and to functions in sociology." Elster is saying, in short, that it is misleading to make use of inappropriate concepts and terms with their powers to distort reality. Functions are more appropriate to the study of biology, while intentions are more appropriate to the study of human beings. Mixing of the two confuses the integrity of each of the disciplines and confuses us as well.

The previous colloquia contained pleas to end the barriers between academicians and interested members of the lay community(ies) on the grounds, first that they created a false distinction between experts and professionals on the one side and lay people on the other, and secondly, that since the entire community was involved in and affected by the changes in our knowledge structure, especially at the level of application (in the form of techniques and technology), it could not be seen as existing in an inferior situation in relation to the first group. There is in such pleas a strong component of guilt and compensatory generosity. My own work has recently paid a lot of attention to the ascendancy of the medical elite and professionals and the implications of such a development. A number of problems arise from further reflection on the issue. In the first place, there is a relationship between scientific and technological knowledge and common sense knowledge that has to be acknowledged by the creators of the first, openly, and without disguise. But once this is done, the problematic is put on the agenda: how to distinguish between knowledge and opinion, which is either another version or form, (or perhaps another problem altogether) of the objective/subjective problem. In turn, that raises the problem of rationality and irrationality, a very weighty one indeed; and how, once we know how to deal with them in non-agnostic or non-nihilistic ways, we can devise humanistic ways to apply criteria of rationality to our actions, whether we are experts or laymen. Finally, this brings up the question of power and coercion -- again the most apparent but one of the least understood aspects of politics: if men are self-acting or have the capacity of being so, can coercion or persuasion have any role in society?, Self-acting persons need not be rational, presumably; yet also presumably, rationality enhances the effectiveness of self-determination. To return to the knowledge/opinion dyad, what provisional arrangement can be devised to enable a fruitful working relationship between

professionals and laymen? How can the conceptual deficits each might have in their efforts to communicate prior assumptions and evolving expectations be overcome?

I think I am now approaching my final point, which has two parts, and which may have the merit of bringing coherence to my thoughts. The first part consists in recognizing that there are possibly (if we follow Detienne and Vernant) two kinds of reasoning and intelligence; epistemic logic and cunning reason, the first developed by Plato and Aristotle and the Greeks, the other developed by their predecessors and appropriate to our knowledge of crafts, politics, and medicine, among other pursuits. These two modes of reasoning, it is maintained, have been sundered with great loss to human thought and knowledge. Once we recognize the detrimental consequences of the separation, can we bring the two species of reasoning together? What may not be too clear, from Detienne's and Vernant's analysis of the two species of reasoning, is whether they are really describing two entirely different realms of experience. This brings me to the second part of my final point. My present answer to the question I have just posed is: "Yes, they are describing two domains of experience each of which demands a different form of reasoning." But I wish to add a qualification. The more I become acquainted with the fluid state of scientific studies: the admissions that scientific knowledge is not necessarily certain knowledge; the failure to prove universality of results; the variant criteria of sound methodology; and the transmission of results, and so on, the less confident I am in the presumed totality of differences between the different systems of knowledge and how they are assembled. It seems to me that the barriers between the two systems are, in the end, not so watertight, and that, in any case, many of the criteria assigned to science lack the rigour it is putatively said to possess. Such a conclusion is not meant to endorse an icono asm that would obliterate genuine and real distinctions. There would be no purpose in such destructiveness. But what I want to raise is the possibility of looking critically at the precise ways in which the natural and human sciences do differ, and how both may be developed to communicate with each other meaningfully. If efforts in this area of human knowledge are not made, then the relationships between the natural sciences, the human sciences, technology, and humanistic values will continue to languish in darkness and reinforce both positivism and obscurantism.

Institute of Human Values

Saint Mary's University, Halifax, Nova Scotia, Canada B3H 3C3 (902) 422-7331

TECHNOLOGY AND COMMUNITY - A PROPOSED MODEL

The central problem in the exploration of "The Human Context for Science and Technology" relates to the development of a method for the exploration of the "human context". Becase we are concerned here with the quality of life, the humanities must be brought into the equation, quantification is not enough.

When, however, we bring in the so-called "soft" methodologies we are faced with the problem of validation. We tend to assume when we leave the apparently sure ground of mathematical correlation we enter a kind of subjectivist swamp in which one opinion is as good as another.

And yet there is a middle ground between subjectivism and positivism and it is found in its most developed form in the historical method and explanation. In this discipline we are concerned with the development of a convincing argument on the basis of evidence rather than with unquestionable proofs. We are dealing in the area of probability rather than absolute certainty. For the historian, talking about the quality of life is not essentially different from reconstructing human personalities and relationships. Both involve constant synthesis and comparison in the sifting of evidence and the building up of an argument for this or that interpretation. It is this mode of enquiry which can provide us with an appropriate theoretical basis for the use of the comparative method in the exploration of the Human Context for Science and Technology.

It so happens too, that the university/community pattern in Atlantic Canada makes such an approach both attractive and practicable. One of the interesting features of the region is its "patch-work quilt" character which is a result of the fact that ethnically distinct groups settled in particular localities and preserved their cultural traditions with great tenacity,

The Annapolis Vally is an example of a region in Nova Scotia which has a distinct cultural heritage and a university (Acadia) which is its institutional expression. If this type of exploration were carried out in that region, a team would be organized based on Acadia but perhaps including persons from other universities and from the community itself, which would be divided into three sections. Section A would concern itself directly with the "four-way interface"; Section B with the quality of life and Section C with the epistemological implications. There would be constant interaction between the sections.

Similar teams could be organized in Newfoundland based on Memorial and its subsiduaries; in Cape Breton (College of Cape Breton); Eastern Nova Scotia (Saint Francis Xavier); Halifax (Dalhousie, Saint Mary's, Mount St. Vincent); Acadian regions (Universities of Moncton and St. Anne); New Brunswick (University of New Brunswick and Mount Allison); Prince Edward Island (University of Prince Edward Island and the Institute of Man and Resources). It would be of the first importance to ensure regular communication between the appropriate sections of the various teams which, in turn, would illuminate and reinforce the interaction between the three sections of any one team. The whole effort would be seen as one project, and could produce a series of important publications.

The objective of the Institute of Human Values since its beginnings has been to develop a critique of culture based on a cross-cultural and interdisciplinary approach to what might be called the quality of life problem. To this end we held three conferences between 1976 and 1978, the papers of which were published in volume XV (1979) of Humanitas. The approach is best judged by reading all three issues but the way in which contributors from diverse disciplines can be mutually enlightening is demonstrated in my introduction to "Beyond Relativism", copies of which are available on the side table.

The conferences have put the Institute in touch with many scholars of world rank who are concerned with the quality of life on what might be called the macro-scale of cross-cultural comparison.We intend to continue to work on this level and we see the possibility of highly stimulating interaction between such activity and involvement in the HCST field in the Atlantic region.

John R. MacCormack, Ph.D. September 26, 1980.
Director

84 Waverley Street
Ottawa
November 27, 1979

Professor Cliff Hooker
Philosophy Department
University of Western Ontario
London, Ontario

Dear Professor Hooker:

Thank you for the package of papers which I received from you, courtesy of Gail Stewart. It was not clear from your enclosed note what you intended me to do with them so I called your secretary to ask that I be sent copies of the letters to me that went astray, also to have the address to which they were sent so that I may discover why mail is not being appropriately forwarded to me.

I have however looked at the papers and while I find them of interest I suspect that they will be of little help in the problem being addressed. This may derive from the fact that they come, with one exception, from the perspectives of the very researchers and institutions who would seem to have a vested interest in the result and hence be situated in a conflict of interest situation in their participation in your exercise. It might be interesting to have the exercise extended, drawing upon others. In any event the present papers are not generally of such quality as I would think the SSHRC could rely upon in developing priorities in the domain, and some are even shockingly derivative of work that is already available in more substantive form, e.g. the Hastings Institute publications.

Back to the matter at hand. I look forward to receiving your letters and hearing from you precisely what it is that you would like me to do, and I shall try to assist you as I am able.

Yours truly,

E. Richmond Olson, Q.C.

141 Cameron Avenue
Ottawa, Ontario
November 8, 1979

Professor Cliff Hooker
Department of Philosophy
University of Western Ontario
London, Ontario

Dear Cliff:

Knowing your days must be crowded, I shall make my comments in point form, hoping that this will be helpful to you.

1. I received your package for Richmond Olson and have passed it on to him. His address is 84 Waverley Street, Ottawa, phone 613-235-2796.

2. A difficulty. When I first received the list of participants I found myself listed in association with the Public POlicy Concern, through which I have not been active for some six or more years. I called your office and asked that a correction be issued in your next mailing, not least because of the discourtesy I might otherwise do to Cathy Starrs, who has continued to use the Public Policy Concern for some of her activities. Also, I myself have for some months, perhaps now a year or two, been engaging in public process quite deliberately from my home address, without institutional affiliation and as member simply of community or, occasionally more formally, as "citizen". So the association of my name with an institution, and that particular institution, was both embarrassing to me and potentially quite damaging to what I have been trying to do. Your earlier letters had not been so addressed or I would have hastened to correct the matter, and I had assumed (and continue to assume) that you were simply approaching me as person. The list which you issued could however give another impression, locating me in a lesser role as professional involved with an institution perhaps, or engaging in your process from the stance of some kind of "expertise". You may imagine my feeling then when your letter arrived today with some corrections to the list, but my situation not attended to. I would therefore be grateful for your assurance (perhaps your secretary could call me) that there will be a printed correction in the papers for the meeting before I am in the position of having to engage in face-to-face conversation with persons I may meet in London. The Westminster Institute simply addressed me at home, so there may not be a difficulty there, but I would appreciate having reassurance from your office before I set out. Thank you. I'm sorry to be so firm about this, but it does matter very much to me, much effort by myself and many others having gone

into this business of characterization (including a large gathering, akin in some ways to the event you are now organizing, at Pugwash two years ago), this attempt to franchise, fully, "mere citizens", "mere persons", in the public affairs of this country. Thank you.

3. You may be interested to know that I am going to be "at home" to a number of friends tomorrow morning to discuss the implications of my paper. These friends are involved in various institutional settings, government, universities, small independent research establishments, community affairs and so on, and I look forward to carrying some of their views along with my own into our meeting next week, and to getting back to them later.

4. With respect to your proposed programme, I think there are some prior matters to be considered before we embark on group meetings that are structured as you propose, to structure them. These prior matters seem to me to arise from the following sources:

- a number of the papers raise matters (implicitly or explicitly) that would need to be addressed before we could be sure that the participants playing the rather highly structured game that you suggest were in the same "realm of discourse", so that any output from the small group meetings in the form of papers, etc. would not be "non-sense". I would single out, for example, Braybrooke, Carpenter, Guedon, Knelmen (implicitly), and my own paper Wynne-Edwards.

- your own initial comments about our historical situation

- a need to know whether those whose papers do not address such prior issues may not have omitted them through a different understanding of their terms of reference

- a need to know the position of participants who did not write papers (Ursula Franklin, for example, has spoken to me of Vanderberg's interests, and I would assume that he might feel that there are prior matters to be considered)

- some of the people contributing written responses may have prior issues that they would believe should be addressed

- some participants, such as myself, may be carrying the informally expressed hopes of various members of the scholarly community in Canada that we will at least attempt to address prior issues, by which they would seem to mean looking explicitly at such matters as the assumptions that would underlie a programme such as you propose.

In the upshot, it seems to me that while you may wish to have your proposed programme ready for use, we may need to take as much time as necessary to clear the prior issues. Indeed the importance of these prior considerations is such that they could well take the whole meeting, but I am sure that you could consider this a significant finding for the SSHRC and be happy with the result, not feeling that it denigrated your proposed programme for the event but was an accurate reflection of the issues that must go into the establishment of research priorities.

For my part, if there is time and energy left, I would be happy to stay and play your game, and indeed would have some curiousity about what the results of such an endeavour among like-minded people might look like. Were it not to be played as game, but seriously, I would have to take an initial stance in Group 3, consistent with my paper, that research priorities with respect to high social impact technologies such as communications are not susceptible of determination by a process focussing on even the spoken, let alone the writeen, word. The process itself would then become an educational device to illuminate my stance, and for that purpose I think could hardly be improved upon, so starkly does it throw into relief the issue of how we attempt to communicate about the things that matter.

But enough. You will see where my suggestion lies. Let us accept your programme, but take as much time as is necessary at the beginning to address the issues that are prior to the game and have already arisen in the process.

5. Finally, my apologies for the lateness of my logistics data. I made my travel arrangements only this week, and sent a letter off to you two or three days ago.. I felt that my vita was only too explicit in my paper, and so chose not to add what could only be more trivial.

I do look forward to seeing you again, Cliff, and I think you have organized a most interesting exercise, and in an extraordinarily short time. I am going to send courtesy copies of this letter, in the spirit of the exercise, to the participants I have mentioned in it, as it hardly seems fair to take their names in vain before we meet without letting them know I have done so.

Warm regards,

As ever,

Gail

Gail Stewart

Phone: 613-235-2796

14 October 1980

HUMAN CONTEXT FOR SCIENCE AND TECHNOLOGY

Reflections on the Montreal Meeting (October 11) and on the Regional Reports

I found the material presented in the regional reports highly disappointing. First, there was little effort to locate the field, or to attempt to establish the theoretical foundations (not a theory of the field) upon which a notion of the field might develop. Second, as others noted in our Friday discussions, there was little attempt in some of the more specific papers, or in the general opening statements, to relate positions taken, or not taken, to a wide body of international literature (sociological, philosophical, political economy or science traditions). As an historian (like Professor Mitchell) I was dismayed by the lack of concern for the historical roots and context that are fundamental to an understanding of so many of the issues at hand. Third, and related to both of the above problematics, was the tendency, in many of the position papers, to collapse the genuinely internationalist and large-scale issues involved into highly particularistic needs. This was evident in the Maritime group's stress on the regional component and in the Ontario group's orientation towards so-called tactical studies. While I recognize the need to insure regional representation and while I would see the necessity of attempting to deal with regional problems in the administration and bureaucratic development of any HCST programme of granting and research, this cannot displace the concerns of the field, which seem to me to transcend regional, even national, particularities. This is not to say, as did Professor Vanderburg on Friday evening, that these issues are centred in Ontario and Quebec (the heartland). It is to say that they encompass the world (as with the threat

we are now facing, with an escalating Cold War and nuclear armaments, of a holocaust). And while I recognize the need for tactical studies (indeed, I refuse to separate tactical from strategic studies), I would not like to see problems of conceptualization downplayed. This is perhaps a central issue in terms of the funding policies. We must insist that the Council institute means whereby funds can be made available for research, speculation, though that do not necessarily encompass the usual grant-getting expense needs (airfares, xeroxing, research associates, planned itineraries with appropriate per diems). The funding must be more flexible than this, allowing individuals leeway to pursue theoretical and empirical work.

A large concern that I have is that non-academic groups be integrated into the process of research in this field. I thereby commend strongly that in each research proposal and in each grant form there be spelled out the applicability of attempting to form some kind of link with the non-academic community involved in the particular problem to be studied. Concretely, I would suggest that when sociologists or historians study the impact of technology on past and present societies they be encouraged to meet with union people (not necessarily trade union leaders) and/or unorganized workers to discuss with them what they think are the issues of significance in the projected study. Also, such historians or sociologists should be encouraged to meet with engineers and/or managers to discuss similar kinds of things. It would be possible for the Council to encourage these kinds of liaisons by putting aside small portions of grants to facilitate such meetings. Similarly, those studying environmental issues might be encouraged to meet with ecological interest groups, etc.;

political scientists have almost always done this in public policy oriented studies and I see no reason why other social scientists should not also follow this procedure. It would help forge links between the academic and non-academic communities that might well develop into more significant forms of inter course.

My own approach to the HCST field would be as follows. I present this not as a 'model', but as how one particular historian, with specific political concerns and perspectives, views the large developments of recent epochs. We must attempt to locate the degrees to which science and technology are self-generating processes (within knowledge, within mechanics) that lie outside of conscious human volition. Here a knowledge of history and periodization is central. In its earliest stages, for instance, technological innovation may seem to follow its own path, pushed towards development by a logic of its own, a rationale peculiar to itself. But, at a certain point, within class-developed societies, that innovation assumes a place within the particular power arrangements and structures of the social order. It comes to serve specific interests, needs, and values. Such needs, values, and interests are not socially conditioned across one culture, nation-state, but are realms of conflict and contest, among social groups, among contending powers, between specific nations (which espouse different social perspectives or embrace different imperial wants). Here we see the extent to which science and technology have become pawns in struggles directed by a logic that is far from internal to science and technology. Which brings us to the ultimate political meaning of such developments, an area of interest on its own. Broadly stated, that is my understanding of central

areas of the HCST field. Within that, we need studies that zero in on particular developments and other studies that attempt to synthesize and conceptualize the larger totality. Such studies cannot, however, be easily divorced from one another.

I can close by arguing that I think this area a central one in which funding (strategic) is essential, in which interdisciplinary work is much needed (but highly problematic and difficult), and in which we must have flexible funding capable of going beyond past Council practices. If the field is to have lasting importance it must be concerned with issues that transcend regional and academic concerns and approaches, and all efforts to break down such narrow confines must be strongly encouraged.

Bryan D. Palmer
McGill/History

HISTOIRE

À qui appartient la science?

La science? Mais elle appartient aux scientifiques! Pas si sûr.

Deux autres instances se partagent le savoir: les industries et les gouvernements. Il pourrait bien y en avoir une quatrième. Et même davantage. Mais la démocratisation de la science est encore loin.

D'un point de vue purement sémantique, le mot appropriation recouvre deux sens différents qu'il convient de souligner d'entrée de jeu. Il s'apparente d'une part à *adaptation* et à *convenance;* d'autre part, il renvoie à l'idée d'acquisition et même d'usurpation. Dans ce dernier sens, il convient quand même de distinguer entre vol et appropriation. Voler quelque chose, c'est prendre la propriété d'un autre; s'approprier quelque chose, c'est l'élever au statut de la propriété dans le moment même où l'on s'en empare. Enfin, loin de déplorer cette ambiguïté, nous la situerons plutôt au cœur du processus d'appropriation.

En élevant quelque chose à l'état de propriété, l'appropriation transforme la nature de l'objet visé et le fait obéir à de nouvelles règles. Lorsque Marx, dans le vingt-septième chapitre de *Capital,* décrit l'appropriation des *commons* par les propriétaires terriens pour les transformer en terrains privés, il montre bien le double effet de l'appropriation. Les terres appropriées peuvent être soumises au jeu de l'achat et de la vente, et leur fonction peut être modifiée. Par ailleurs, et d'un point de vue plus général, notons aussi que l'analyse de Marx relie le concept d'appropriation à des objets (des terres), des statuts juridiques (terres communes, privées), des acteurs (les paysans, les propriétaires) et des règles du jeu (transactions marchandes par échange d'argent). L'appropriation, en effet, n'a de sens comme concept que si elle est insérée dans un réseau d'objets associés, à la fois réels et compatibles entre eux. Il s'agit donc de voir si, en s'étendant au domaine scientifique, la notion d'appropriation peut s'insérer dans un réseau de même type. Plus précisément, quels peuvent être les objets manipulés, qui sont les acteurs, à quoi correspondent les changements de règle et dans quel contexte se situe tout ce processus? Pour tenter d'apporter des éléments de réponses à des questions aussi difficiles, nous nous approprierons à notre tour certains concepts forgés par Bourdieu.

Une étrange propriété

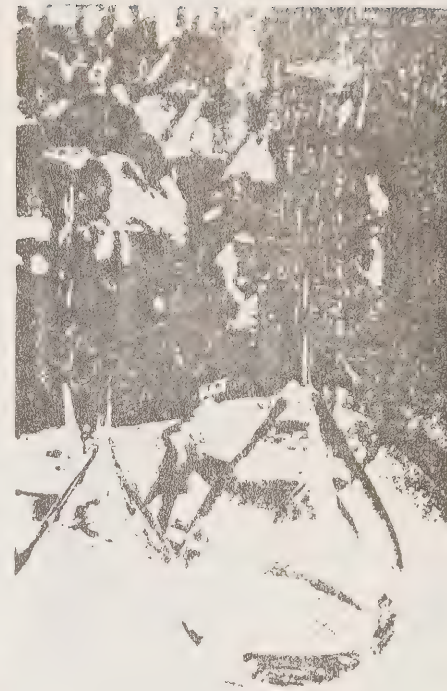
Bourdieu nous rappelle que «l'univers 'pur' de la science la plus 'pure' est un champ social comme un autre, avec ses rapports de force et ses monopoles, ses luttes et ses stratégies, ses intérêts et ses profits, mais où tous ces invariants revêtent des formes spécifiques.» Il souligne par ailleurs que l'enjeu spécifique de l'activité scientifique, c'est le monopole de l'*autorité scientifique,* laquelle autorité repose à la fois sur une certaine *capacité technique* et un *pouvoir social.* Enfin, rappelons aussi que la lutte pour le monopole scientifique se situe dans un champ dont les limites et l'autonomie par rapport à d'autres champs d'activité font également partie des enjeux de la lutte entre scientifiques dans la mesure où c'est la définition du champ qui détermine l'inclusion ou l'exclusion de certaines règles dans le champ.

Bourdieu utilise lui-même l'appropriation, mais plutôt comme notion pour ne pas dire métaphore, que comme concept. Lorsqu'il écrit: «Le champ scientifique est toujours le lieu d'une lutte *plus ou moins inégale,* entre des agents inégalement pourvus de capital symbolique, donc inégalement en mesure de s'approprier le produit du travail scientifique...» Bourdieu se limite à une expression très générale d'un processus qui peut être abordé de manière beaucoup plus précise. Il faut d'abord se rappeler que l'appropriation du travail scientifique se passe dans les textes que produisent les scientifiques et grâce auxquels ils occupent des lieux dans leur champ d'action. Or tout texte, comme le souligne très justement J. Kristeva: «... se construit comme mosaïque de citations, tout texte est absorption et transformation d'un autre texte. À la place de la notion d'intersubjectivité s'installe celle d'intertextualité...» À la place d'influence, pouvons-nous continuer, s'installe l'appropriation — mais non pas une appropriation générale et vague. Cette appropriation se marque dans la pratique discursive des scientifiques.

En résumé, il est impossible de voir qu'au concept d'appropriation s'associent des acteurs (les scientifiques), des objets (les textes scientifiques), des statuts juridiques (droits des auteurs par rapport à leur texte) et un système d'échange (citations et autres formes moins explicites d'intertextualité); il est impossible aussi de voir que tout ce processus se situe dans un contexte qui spécifie les rapports entre ces différents éléments (un champ scientifique).

Des classes scientifiques

L'extension et le fonctionnement du concept d'appropriation peuvent être illustrés en faisant appel à un exemple historique pr[illegible] qui permet de mieux saisir les enjeux d'u[illegible] telle opération ainsi que les avantages qui peuvent en résulter pour le discours historique lui-même. Prenons l'Académie Royale des sciences de Paris aux alentours de 1699, quand cette institution subit une refonte de structure très significative.



Roger Hahn a clairement décrit les deux objectifs poursuivis par la royauté en créant l'Académie: il s'agissait et de fonder un corps technique consultatif et de glorifier le Roi Soleil. La gloire découlait de l'existence même de l'institution académique tandis que son utilité technique émanait directement de l'activité des académiciens. Et au double objectif royal correspond un mode d'organisation de l'activité scientifique qui nous semble bien éloigné de ce que nous appelons de nos jours la science: les membres de l'Académie, peu nombreux, tenaient des réunions fermées au public et leurs rares publications étaient souvent anonymes, ce qui les reléguait au rang d'obscurs fonctionnaires de la monarchie.

La période par Louvois est souvent interprétée comme une période de déclin parce qu'associée trop étroitement à des visées utilitaires, mais cette opinion repose sur l'opposition entre science pure et science appliquée, et elle admet implicitement que cette opposition est nécessaire. En fait, on peut interpréter la situation différemment et émettre l'hypothèse que Louvois tentait d'augmenter le rendement intellectuel des académiciens pour que l'institution académique puisse x remplir sa double fonction. Et ce qui ne plus de poids à cette hypothèse, c'est que, en 1699, l'Académie subit une réforme profonde qui eut justement pour effet d'accroître sa production scientifique. Mais ce résultat ne sera acquis qu'au prix d'une redistribution des pouvoirs au sein de l'Académie: en bref, les académiciens trouvèrent le moyen de s'approprier une partie des bénéfices provenant de leur activité tout en satisfaisant mieux certains désirs du roi. Voyons de plus près les éléments de cette négociation.

À partir de 1699, l'Académie n'abrite plus la science, mais des classes scientifiques où plusieurs secteurs de savoir trouvent leur siège. Par ailleurs, la structure hiérarchique propre à chaque classe transforme une activité qui se voulait jusque là collaboration en activité concurrentielle; et comme pour garantir le nouvel état de concurrence au sein de l'Académie, des volumes annuels paraissent où histoire et mémoires sont imprimés. Enfin, l'accès à l'Académie et la promotion d'un rang à un autre à l'intérieur d'une classe passent sous le contrôle partiel des académiciens.

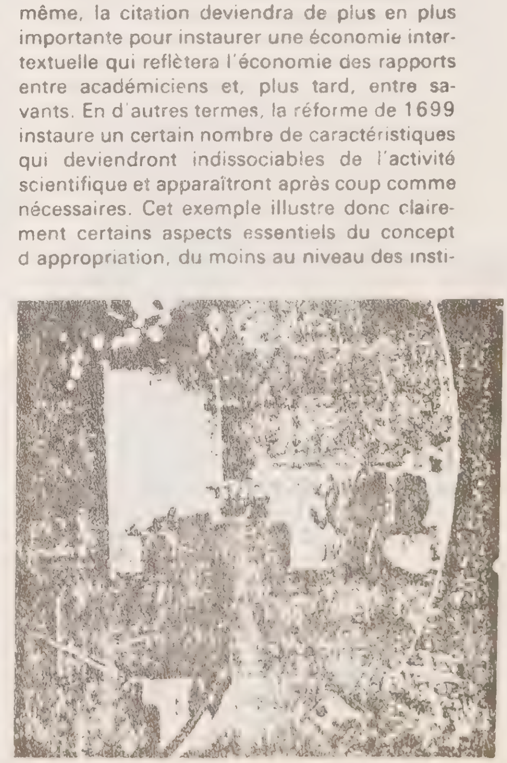
La nature de la science

Pour donner une interprétation de ces transformations, il est utile de penser à nouveau en termes de champ au sens de ...dieu. Les académiciens, en 1699, réussirent à faire changer les règles de l'activité scientifique en transposant une bonne partie de la structure corporatiste à l'intérieur de l'institution: accessibilité limitée, jugement par les pairs, membres de la corporation, gestion interne des affaires de la corporation, concurrence très soigneusement limitée de façon à ne pas léser l'ensemble de la corporation, etc. Ce faisant, les académiciens se dotent d'une autonomie relative par rapport au pouvoir royal et instaurent donc les éléments d'un champ en voie de constitution. Déjà, à ce niveau, ils s'approprient plusieurs pouvoirs qui, jusque là outrepassaient leurs prérogations d'académiciens-fonctionnaires. Par ailleurs, le phénomène de concurrence qui se manifeste par des publications périodiques courtes et *signées* indique également que cette corporation prend la forme d'une corporation d'*auteurs scientifiques*. Mais, du même coup, l'activité académique tend à se scinder en deux parties distinctes: d'une part, celle de chercheur; d'autre part, celle d'expert technique. À première vue, on peut dire que la tension croissante entre les exigences propres à ces deux types d'activités marque l'instauration d'une opposition entre science pure et science appliquée. Mais ce n'est pas tout, car les avantages liés à la poursuite de la science pure font que celle-ci se trouve valorisée et de plus en plus privilégiée par les académiciens: on trouve là le modèle d'une évolution propre à l'ensemble des activités de savoir situées au sein d'institutions qui ont été créées de l'extérieur. Dans le cas de la science, cette évolution mène inéluctablement à la théorisation à outrance et à la formalisation dans la mesure où l'ésotérisme qui se rattache à ces deux caractéristiques favorise l'autonomie relative des praticiens face aux pouvoirs externes. En d'autres termes, la théorie et la formalisation constituent, entre autres choses, des instruments puissants d'appropriation pour les individus impliqués dans une activité donnée. Dans le cas des académiciens, on peut dire que cette évolution leur permit de *détourner* l'institution des objectifs premiers qui ont présidé à sa création; du même coup ils modifient leur propre activité et par voie de conséquence la *nature de la science*.

De l'autre côté de la barrière, il ne faut pas imaginer que l'appropriation de l'activité scientifique par les académiciens n'entraîne que des désavantages pour le pouvoir royal. En fait, le succès de cette manœuvre d'appropriation dépend dans une large mesure de la réaction royale. Or, la plus grande productivité de l'académie entraîne un plus grand rayonnement qui rejaillit sous forme de gloire pour la monarchie. Seulement, le roi ne tire plus son prestige du fait qu'il est le protecteur d'une institution, mais du fait qu'il est le mécène d'auteurs célèbres. La gloire du roi dépend donc de la renommée du savant, lequel peut maintenant négocier les moyens d'asseoir cette renommée en termes de ressources et privilèges.

La notion d'influence

La réforme de 1699 entraîne aussi d'autres conséquences qui ont contribué à faire évoluer la *figure* même de la science: contenu et style du discours scientifique s'en trouvent affectés. Le *mémoire* court prend le pas sur le livre, et par voie de conséquence le résultat parcellaire mais nouveau est privilégié par rapport à la synthèse récapitulative et même didactique. La recherche de la démarcation aussi bien que la concurrence sont renforcées mais, en même temps, le cadre institutionnel requiert pour son image extérieure et sa protection l'existence d'un code de courtoisie. Le style des mémoires perd donc largement l'aspect polémique qui caractérisait souvent les livres publiés hors de toute institution. Bref, un style neutre, objectif, détaché s'élabore au sein de l'Académie, et dominera bientôt toute la documentation scientifique au point d'en devenir une marque essentielle. De même, la citation deviendra de plus en plus importante pour instaurer une économie intertextuelle qui reflètera l'économie des rapports entre académiciens et, plus tard, entre savants. En d'autres termes, la réforme de 1699 instaure un certain nombre de caractéristiques qui deviendront indissociables de l'activité scientifique et apparaîtront après coup comme nécessaires. Cet exemple illustre donc clairement certains aspects essentiels du concept d'appropriation, du moins au niveau des insti-



tutions. Reste à voir le rôle de l'acteur historique face à un processus d'appropriation; en d'autres mots, comment peut-on articuler l'individu au processus d'appropriation auquel il participe?

Ce dernier problème correspond exactement à la notion d'influence dans la mesure où celle-ci met en jeu l'esprit qui n'est qu'une synecdoque de l'individu. Mais là où l'influence agit comme si elle se répandait d'un sommet le long de déclivités intellectuelles naturelles, comme si elle s'étalait à partir d'un point d'origine à la manière d'une tache d'huile, l'appropriation ne se situe pas par rapport à une origine mais constitue sa propre origine dans le rapport qui lie un ou plusieurs individus à une situation historique définie. Ce rapport est complexe, car les processus historiques auxquels nous participons demeurent toujours partiellement opaques; il dépend donc des jeux de représentations qui permettent à l'individu de s'actualiser en agent historique. Par ailleurs, le processus d'appropriation est toujours dirigé contre un pouvoir, individuel ou collectif; il est donc lié à une lecture conflictuelle de l'histoire même dans les cas où les agents historiques vivent ces événements d'une tout autre manière. Ainsi,

lorsque Diderot s'approprie certains concepts de la chimie de G.-F. Rouelle pour étayer son matérialisme, il le fait largement pour donner une base *scientifique* à son point de vue, sachant fort bien que Newton soutient l'existence d'un dieu par un argument scientifique. Le rapport Rouelle-Diderot ne repose donc pas sur une influence mystérieuse et d'autant plus incompréhensible que Rouelle, de l'avis même de Diderot, était un homme fort pieux; en fait, Diderot trouve dans le travail de Rouelle des objets qu'il transforme en armes susceptibles de le servir dans ses propres batailles. De son point de vue, il emprunte; du nôtre, il s'approprie.

Enjeux politiques

Alors que le XIX^e siècle voit s'instaurer, *grosso modo*, une autonomie croissante de la science, les deux guerres mondiales du vingtième siècle permettent une mobilisation presque totale de la science dans tous les états belligérants. Mais cette nouvelle appropriation de la science par les états transforme cette science une fois de plus: l'information scientifique ne circule plus librement mais, au contraire, demeure cloisonnée à l'intérieur d'un système rigide de diffusion restreinte et le savant se retrouve très près de la situation de l'académicien d'avant 1699. Edward Shils, parmi d'autres, s'est fait le porte parole des savants qui ont protesté contre cet état de fait et dans un livre publié en 1956, *The Torment of Secrecy*, il a écrit des lignes qui reflètent bien les stratégies de réappropriation mises en action par ces savants:

La science est loin d'être seulement un instrument susceptible d'augmenter la puissance militaire ou de contribuer au bien-être économique. C'est une des plus hautes formes d'expression de la nature humaine et de sa liberté. L'activité scientifique est l'activité d'hommes libres — non pas de tous les hommes libres, mais de ceux qui ont des compétences et des dons particuliers — et la communauté scientifique constitue le point le plus élevé d'une société libre. En elle-même, la science offre le modèle d'une société libre...

Il suffit, bien sûr, de demander «libre à l'égard de quoi?» pour se rendre compte que Shils ne réclame en fait que la restauration de l'autonomie de la science menacée par la seconde guerre mondiale et la guerre froide. Et, en gros, les scientifiques ont récupéré leur autonomie tout en conservant une grande partie de l'aide financière gouvernementale dont ils avaient bénéficié pendant la guerre. Du même coup, les gouvernements ont tenté de réagir à leur tour par la planification et l'élaboration de ce qu'on appelle maintenant la politique de la science.

La situation actuelle de l'activité scientifique est relativement simple à décrire: trois instances seulement peuvent se prévaloir d'un accès efficace au savoir scientifique: les scientifiques eux-mêmes, les industries et les gouvernements. Ceci veut dire que les modes efficaces d'appropriation de la science au vingtième siècle sont très limités, tout en étant suffisamment variés pour permettre à la communauté scientifique de se défendre avec quelque degré de succès face aux velléités toujours présentes de mobilisation, soit par les gouvernements, soit par les grandes industries. Mais en même temps, une fraction significative du produit de l'activité scientifique est quand même appropriée par l'une ou l'autre de ces instances, ce qui mène tout droit aux problèmes de l'utilisation de la science avec toutes les questions éthiques qui s'y rattachent.

Divulgation

Ce sont précisément ces questions éthiques qui ont amené un certain nombre d'individus, membres de la communauté scientifique, à prendre du recul par rapport aux intérêts étroits de leur groupe et à tenter de modifier volontairement le sens de leur activité. Ainsi, le problème de la bombe atomique a donné naissance au *Bulletin of A... Scientists* aux conférences Pugwash. Plus récemment, des scientifiques ont voulu mettre leur savoir directement au service des gens et non des gouvernements ou de l'industrie et l'organisation *Science for the People* constitue un bel exemple de cette tendance qui mérite d'être examinée de plus près.

Dès 1971, Jérome Ravetz avait analysé ce qu'il appelait la «science critique» et en avait montré les limites. Cette science critique, c'est en fait de la recherche scientifique menée souvent de façon collective et interdisciplinaire et dont le but est d'analyser les dommages infligés à l'homme et à son milieu par une technique devenue incontrôlable. Cette analyse scientifique est alors diffusée non par les canaux traditionnels de la science, mais en s'adressant directement aux populations concernées pour transformer le savoir scientifique en mouvement politique. En d'autres termes, la science critique opère une *divulgation* de la science, opération qui diffère complètement d'une vulgarisation de la science, et qui remet ainsi profondément en cause le fonctionnement traditionnel et l'autonomie relative de la communauté scientifique en permettant l'appropriation du savoir qu'elle détient par des ensembles humains qui en avaient été privés jusque là. Et cette nouvelle forme d'appropriation, comme toujours... traîne une modification de l'activité sci... que en menant à des formes de collaboration nouvelles organisées autour d'objets également nouveaux. Traiter de phénomènes comme les nuisances industrielles, les phénomènes globaux ou locaux de pollution et ainsi de suite revient à focaliser l'activité

scientifique sur des objets jusque là largement délaissés et à former des relations interdisciplinaires et intersectorielles nouvelles. Mais du même coup, ces zones de savoir se trouvent au moins relativement valorisées et dans la mesure où elles acquièrent un certain droit de cité, elles deviennent à leur tour objet de convoitises et source d'arguments en faveur de demandes de subventions de recherche accrues. Par ailleurs, le volontarisme divulgateur du scientifique bien intentionné se transforme rapidement en un rôle renouvelé d'*expert* au service non plus de groupes sociaux concernés, mais d'agences gouvernementales de contrôle. Toute une technique, puis une industrie s'allie alors à ces nouveaux développements théoriques, pour le plus grand bien du P.N.B., tandis que la société se met à fonctionner comme deux personnes dont l'une remplit le trou que l'autre creuse: de la même façon, un secteur de la société est amené à dépolluer ce que l'autre pollue. Alors, la science critique qui avait pu un instant être conçue comme un détournement possible de l'activité scientifique s'avère finalement très vulnérable à la récupération, forme particulière de l'ap-p...riation. En offrant un champ élargi d'acti- la lutte contre la pollution sert les gouv...ements, les scientifiques et, paradoxalement, les industries elles-mêmes.

En résumé, ni les codes déontologiques, ni les formes de volontarisme rebelle ne peuvent donner de bons résultats à long terme: les premiers constituent le plus souvent des réactions d'auto-défense d'un groupe donné lorsque celui-ci se sent menacé par un pouvoir extérieur; les seconds dépendant trop de la présence ou de l'absence d'individus particuliers pour maintenir leur activité et, comme groupe, ils sont pris entre une marginalisation par le radicalisme purificateur et une corruption par les compromis qu'ils peuvent chercher à négocier avec les pouvoirs auxquels ils s'opposent en principe.

La troisième voie

Il existe pourtant une troisième voie qui pourrait ouvrir des perspectives intéressantes dans la mesure où elle s'appuie sur les phénomènes inévitables d'appropriation pour en tirer parti. Cette troisième voie repose sur la multiplication des instances en mesure de formuler des exigences précises, en mesure aussi de les adresser à la communauté scientifique et donc de s'approprier à leur avantage une partie de l'activité scientifique. Ainsi, les ...dicats ont des questions à poser à la ...e: toxicité de milliers de produits chimi-..., transformation des conditions de travail ...ées à la mise en fonction de nouveaux moyens de production telles les machines-outils à contrôle numérique, et ainsi de suite. ...r les syndicats n'ont pas su ou pu capter ...savoir scientifique en dehors de quelques ...s relativement rares et, de toutes façons, le nombre de questions qu'ils pourraient poser est tellement grand que des ressources financières majeures devraient être mobilisées ne serait-ce que pour faire démarrer un tel programme de recherches. Or les gouvernements disposent de fonds importants pour financer la recherche et, actuellement, ils gèrent directement ces sommes ou font des subventions aux industries, ou encore s'associent des comités de scientifiques qui administrent ces fonds pour le plus grand bénéfice de la communauté scientifique elle-même. Le principe de délégation est donc déjà admis par les gouvernements, mais le cercle des délégués admissibles est étonnamment étroit. Il s'agit donc de l'ouvrir. Nous avons mentonné les syndicats, mais d'autres organisations pourraient être impliquées ou, mieux encore, pourraient avoir l'occasion de démontrer qu'elles aussi ont le droit de bénéficier directement de l'activité scientifique: pensons aux consommateurs, par exemple, et même, en rêvant un peu, à une pédagogie qui ne serait pas seulement affaire de maîtres, mais aussi d'élèves, à une médecine qui impliquerait patients aussi bien que médecins ou techniciens et infirmières, et ainsi de suite. En bref, la présence de nouveaux bailleurs de fonds permettrait de poser des questions nouvelles aux scientifiques en quête de subventions; le lieu social d'où seraient posées ces questions varierait d'un organisme subventionnaire à un autre et modifierait donc les attentes que l'on peut avoir à l'égard de l'activité scientifique et, par voie de conséquence, la nature de l'activité scientifique elle-même.

Cette multiplication d'instances en mesure de présenter des demandes aux scientifiques ne constitue pourtant pas une solution définitive au problème de la démocratisation de la science; tout au plus permet-elle de lancer un processus qui, nécessairement, entraînera des stratégies de neutralisation et de récupération de la part de toutes les instances déjà concernées. Par exemple, le gouvernement, en finançant un nombre plus grand d'organismes chargés de poser des questions à la science multiplie par là-même ses possibilités d'intervention et les scientifiques peuvent profiter de la plus grande dispersion des organismes subventionnaires pour, d'une part, accroître d'autant son autonomie, et, d'autre part, espérer augmenter le niveau global de son financement. Mais ce raisonnement ne constitue pas pour autant une réfutation de la thèse proposée dans la mesure où toute tentative d'instauration d'une politique de la science ne peut être conçue que comme impression d'un *mouvement* et non d'un *état*. Dans le pire des cas, une allocation plus dispersée des fonds rapproche aussi d'une dispersion plus grande des pouvoirs et, dans la mesure où ce simple objectif semble souhaitable, ce que nous croyons personnellement, il y a déjà progrès.

Pour une critique de la critique

Au terme de cette brève excursion épistémo-politique, il est maintenant nécessaire de revenir sur le sens d'une telle démarche. Là encore, la notion d'appropriation se trouve au centre de ces dernières remarques. Nous avons mentionné en début de texte notre appartenance à l'Institut d'histoire et de sociopolitique des sciences; ce n'est pas par hasard. L'Institut s'est construit à la croisée de plusieurs disciplines dont certaines étaient beaucoup mieux définies que d'autres. De plus, histoire et sociologie des sciences n'ont pas toujours cohabité aisément et la politique des sciences jusqu'à une date très récente a semblé largement étrangère aux préoccupations de ces deux premiers domaines.

Depuis la création de l'Institut en 1973, de nombreux efforts ont été accomplis dans le but d'abord d'établir les limites et les insuffisances de nos disciplines d'origine et ensuite d'élaborer de nouveaux concepts susceptibles de nous servir tous. En présentant cette analyse encore sommaire du concept d'appropriation, nous pensons nous situer dans cet axe de réflexion conceptuelle qui précède toute rencontre féconde entre plusieurs domaines disciplinaires. Et l'avantage final du concept d'appropriation, c'est qu'il englobe aussi bien l'activité du scientifique que celle du chercheur sur la science; il permet donc une analyse de la science en même temps qu'une auto-analyse de la recherche. Ce n'est qu'à ce prix qu'une épistémologie critique de l'activité scientifique peut s'élaborer sans s'appuyer sur les fondements épistémologiques de la science elle-même.

Jean-Claude Guédon

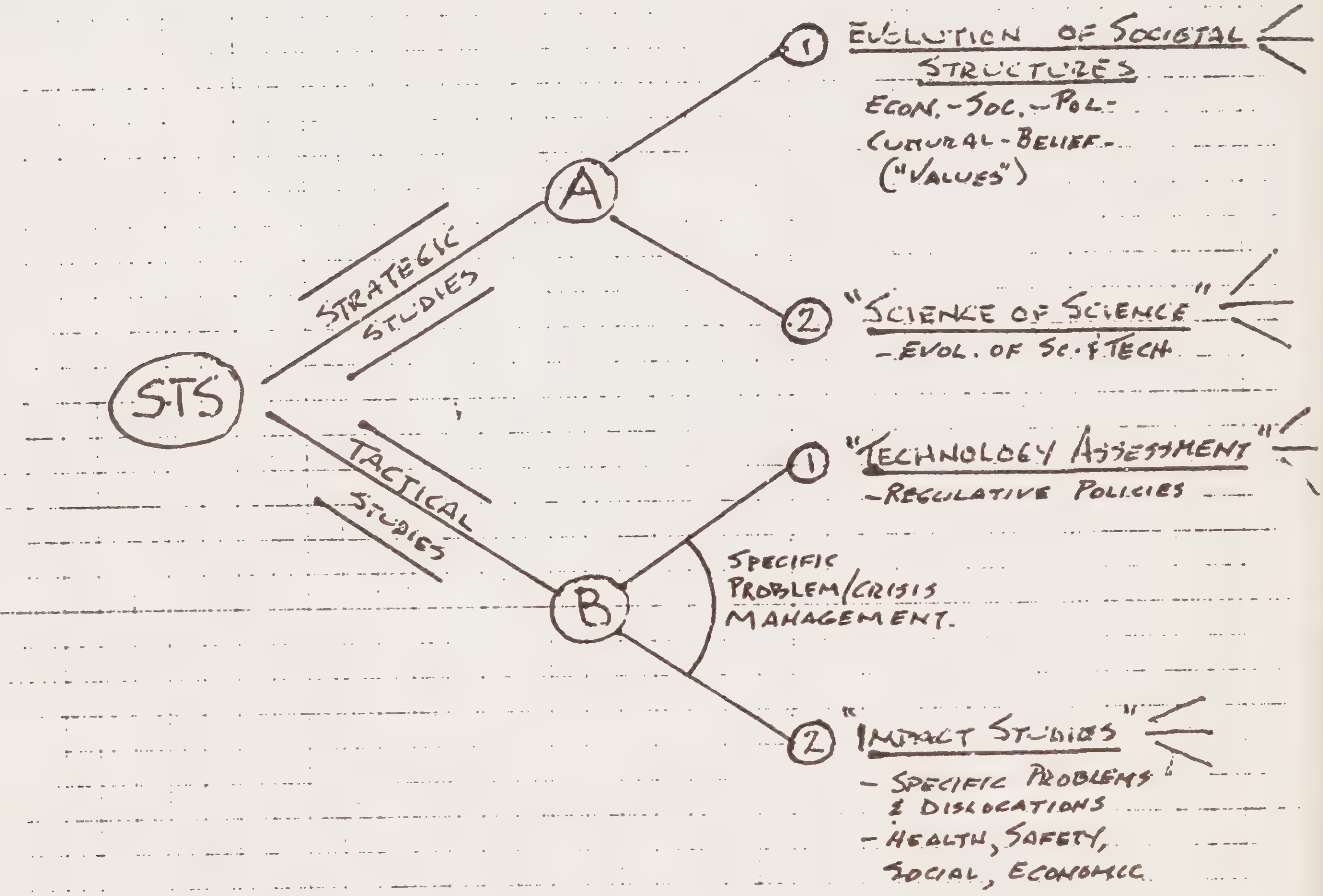
NOTES BIOGRAPHIQUES

M. Jean-Claude Guédon est né au Havre (France) le 28 février 1943. Il détient un Ph.D. en ~~chimie~~ Histoire des Sciences de l'Université du Wisconsin. Professeur agrégé à l'Institut d'histoire et de sociopolitique des sciences, M. Guédon s'est particulièrement intéressé à l'histoire de la chimie et du génie chimique, aux questions de méthodologie dans l'histoire des sciences. Il entreprend aujourd'hui le projet d'étudier la communauté scientifique québécoise entre les deux guerres.

STS – MONTREAL – NOTES (OCT 9-10/80)

– T.L. BATKE

① SCOPE OF STUDIES IN STS (SCIENTIFIC-TECHNOLOGICAL SOCIETY)



② "HCST" REPORTS (WESTERN-, ONTARIO-, ATLANTIC REGIONS)

1) APPEAR TO AIM AT "TACTICAL" STUDIES, (B-1,-2), PRIMARILY
2) HENCE, "REGIONALISM", "NATIONAL NEWSLETTER", "INTER-DISC." "STORE-FRONT ACADEMICS" "COMMUNITY GROUPS IN RESEARCH PROJECTS" – MAY BE APPROPRIATE, BUT –
3) FOR "STRATEGIC" STUDIES, (A-1-2): – NOT RELEVANT

UNIVERSITY OF TORONTO
Faculty of Applied Science and Engineering
Toronto, Canada M5S 1A4

DEPARTMENT OF INDUSTRIAL ENGINEERING

October 29, 1980

Prof. J.C. Guedon
University of Montreal
IHSPS

Dear Jean-Claude:

I apologize for the tardy and hurried write-up of the comments I presented verbally to you and your group in Montreal. I am going to present them at St. Mary's on the 31st as complementary to your group report. This is in no way an expression of disagreement with the group report. I concur heartily with it. I am presenting it separately only because I did not have time to send it to you for consideration, excepting, and inclusion. I repeat it is complementary and, of course, I take full responsibility for that which appears here alone.

Sincerely,

John

John W. Abrams
Professor

JWA/sah

COMMENT TO MONTREAL GROUP

J. W. ABRAMS

The various papers and presentations submitted to the national and regional meetings give me concern as one who has been working on the interactions between technology and society for several years. They raise very real problems most of which treat the interface between technology [which in my mind includes applied science] and the other facets or features of society.

When I look at the contributions from the point of view of an engineering scientist and a humanist, their only connections appears to be that they all lie at this interface and that they arise from dissatisfaction with current knowledge or applications, which latter are seen to lead to detrimental conditions partly because of inadequate knowledge. Thus the decisions which have led to technological application appear to be made with inadequate consideration for those affected. Moreover, it is sometimes believed (and rightly) that the information for decision has been concealed or held inaccessible to those impacted. That the dissatisfaction exists is patent; that it is generally justified is an opinion I personally hold. I do see HCST as an important field for study; I do not see it as a discipline. In fact I see the dissatisfaction as a call for the humanistic elements of society to take up what they have largely abjured, a working interest in the process of technological decision. It is a call for an expansion (in humane concern) of our current methods.

Let me look at this situation with the eyes of an engineer. He wishes to attain an objective, which, because it is the way he has worked in the past and because it is the way of past "success", is often expressed in mathematical terms. He expresses all <u>his</u> or <u>her</u> desiderata (note that I say, his or her) in the form of an objective function. The task - as he sees it - is to juggle the values and quantities in the objective function so as to achieve the "best" solution. Best, at this point here, is not yet defined. Along with the objective function one has a set of constraints. These may be laws of nature (scientific laws), which one cannot violate, or they can be any other restraining factor which <u>he</u> or <u>she</u> considers relevant. These should (and do, even in past work) include known side-effects and the ambient environment. (see appendix)

Now when one examines the decision process starting from the constraints, it is obvious that in the past many detrimental side-effects or interactions with other systems have either been ignored even if known, or, not included because they are unknown. Hence what many persons in their submissions are saying is that the known process is only being partially applied - we are omitting relevant social factors. It is probable that in the

selection of constraints the engineer initiator has considered to be negligible, factors which other parts of society consider vital. Better communication - not a new field - is needed here. This involves interdisciplinary decision making - a valid, but not new, field of research.

However, the engineer along with interdisciplinary advisers may not know how to include some of the factors desired by other parts of society. Here is clearly a field for research on two levels: (1) a general study on ways to include constraints less concrete than physical ones; (2) specific studies - this is where regional preferences enter - with the goal of providing material for an eventual inductive generalization.

Now I wish to turn to the objective function, the goal. I specifically expressed it as personal to the designer or the designing group. The optimized objective function, subject to the constraints, is supposed to yield the "best" result. But what simple engineer or engineering design group (I stick with the term engineering to make my point; it includes bio-engineering or any technological application) knows what is "best". This is truly a task for God, but philosophers, theologians, politicians, psychologists and social scientists appear willing to step into the breach. Fine, let them and me as an humble historian do so as well. But now what is it that we are calling for to serve to alleviate the dissatisfaction with the present inadequate method. We are not asking for a new field nor a new morality nor a new humanism. We are asking the engineer or decision maker to widen the scope of his or her interest, we are asking him or her to pool knowledge of procedure with the humanistic vision or knowledge of others, but I, at least, have seen no new method proposed. I see the problem to lie in establishing communication literally between the "two cultures."

One may propose another decision structure, but I know of none that can transcend the physical laws of nature which have dictated the form given in the appendix. The structure is robust enough that it can be extended to include non-mathematized constraints and objectives, although the methodology of inclusion for optimization may be new.

When, and if, this communication between the cultures is established within the technological decision process, specific problems will indubitably emerge. I make no attempt to foresee them, except that social considerations cannot change the laws of nature, elimination of risk may be economically infeasible and require a trade-off, different persons, groups, regions, nations may have different desiderata, or morals. While these are neither new general problems nor a new field let alone discipline, they merit study by specific examples in specific environments.

Thus I see research concentrating into two areas

1. Multi-disciplinary and multi-criteria decision theory research which may be concentrated about the HCST; and

2. Attempts to solve specific projects in the HCST area in which one both tries to solve or alleviate the problem, but proceeds in such a manner that generalities may arise by induction.

   It is highly probable that new moral issues will be unearthed here as well as specific technical problems both of which will require solution or resolution in the specific case with the hope of generalization.

As to the nascent, often invisible problems, light may be shed upon them by traditional studies in the philosophy and sociology of technology perhaps with wider multi-disciplinary input.

I feel one weakness common to most specific suggestions to-date is the neglected input from those who appreciate the strength and limits of constraints R, the "laws of nature", presumably natural scientists. I sense a feeling by those impacted by a technological application that the initiators had the relevant information but concealed it. If this be the case inclusion of the concerned in the decision process would suffice. However, as I believe is the more frequent case, the data necessary to alleviate a concern or reduce a risk may be unknown or not derivable from current theory. This condition is an important one to explore. Investigation can and should give rise to significant scientific research, whose objectives arise from humanistic input. However, such research will cost (in $) in the order of magnitude of current scientific research. It cannot be carried out within a SSHRC budget, and, as it requires scientists to undertake, should presumably be undertaken jointly with NSERC. I fear that one project of this type, albeit important, could exhaust the available SSHRC budget and squeeze out a general attack which in the long run would be more valuable. This is one of my major concerns.

The other concern stems from the fact the HCST is looked upon in the meetings - and specifically in the guideline paper - as a new and unexplored field with few workers. While there may be few workers in Canada - I suspect there are more than the meetings have unearthed - there are many elsewhere. Little mention is made in the HCST papers, here, of the extensive work already done in France and in the U.S. I note that, although the

Society for Social Studies in Science, met in Toronto this month and discussed relevant problems and research, the SSSS is not mentioned in any of the HCST papers nor is their journal-newsletter. Again the Council on Understanding Technology in Human Affairs (CUTHA) was unmentioned although they are actively pursuing methods to establish humanistic constraints in technological decisions. By "going it alone" Canada may reach new connections of importance, but I feel that we should ensure that our workers are not exploring areas already explored. I would strongly support a program (perhaps through a society or newsletter) to inform our community. And, most importantly, I would recommend that any evaluating or assessing panel be familiar with the worldwide state of research.

FORMAL APPENDIX

Mathematically or formally the decision problem can be expressed as:

<u>Choose</u> X_i $(i = 1 \ldots)$ decision variables

so as to

<u>Optimize</u> $Z = f(X_i, y_j) = 0$ the objective function

subject to

$g_k(X_i, y_j) = 0$ Constraints R (see below) $(k = 1 \ldots)$

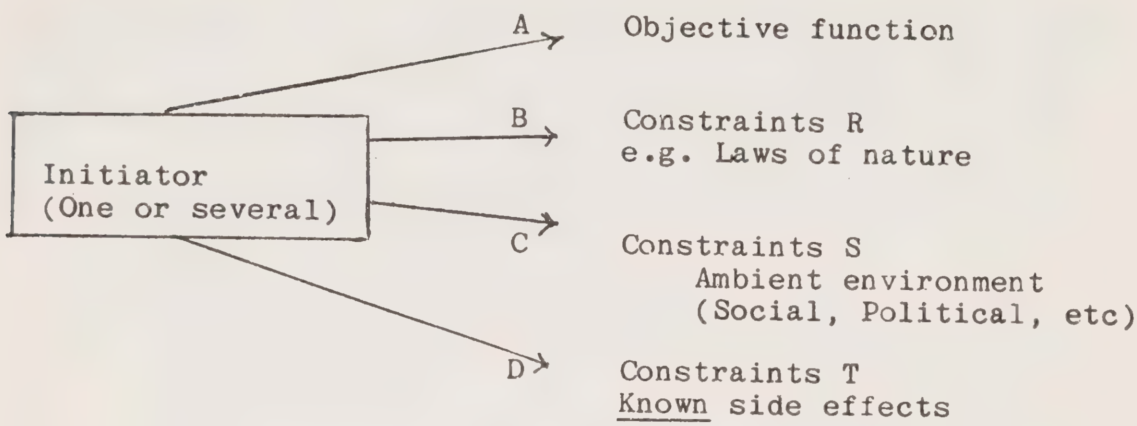
$h_n(X_i, y_j) = 0$ Constraints S (see below) $(n = 1 \ldots)$

$V_m(X_i, y_j) = 0$ Constraints T (see below) $(m = 1 \ldots)$

where y_i = environmental variables, descriptive of the situation under which we wish to optimize Z.

The flow of required information from the decision delineator or initiator required to establish [NOT SOLVE] the problem is shown below:

I. Projects where an initiator can be found.



A = Requires multi-disciplinary decision

B = Requires natural science and/or engineering expertise

C = Requires information about human environment

D = i) Requires social and technical forecasting - vision into the future

ii) Requires knowledge of all non-negligible interactions with other projects or systems

II. Projects with anonymous initiators - anonymous in the sense of Geidion.

At some stage of development an initiator may be found. However, such developments are often nascent for years. Prior to recognition of a developer or initiator, these movements can perhaps be recognized by a multi-disciplinary team and fed in constraints B' and C' as required.

Ted Schrecker
September, 1980

NOTES ON A SOCIETY IN THE HCST FIELD

The importance of an organizational framework, or at the very least a series of networks, to the development of the HCST field was noted in the proceedings of the November, 1979 meeting, both in Cliff Hooker's preliminary report (p. 29) and by participants in the November meeting, for example George Bindon (pp 58-59). Prof. Bindon's comments on the idea of support for a learned society in the field bear repeating:

> "This will be considered by many to be premature. Yet there is something of a 'chicken and egg' syndrome at work here. Without an identifiable and naturally-evolved group of scholars there is no basis for an academic society. However, it is within the Canadian tradition for scholarly societies to be created on the initiative and support of federal agencies. And without such an initiative, the forces previously described may well preclude the natural evolution of a scholarly community in this new field."

The idea of some sort of organization of people working in HCST recurs in all the regional reports from the spring, 1980 meetings. The Western regional group report explicitly recommends formation of an HCST association (p. 14). The Ontario region report notes that "some kind of structure would need to be established . . . to assist the growth of the field" (p. 8) and the Atlantic regional report concluded:

> "There appeared to be general agreement that a collective regional effort was called for and that some type of umbrella organization was needed, which could act as a clearing house of information, organize regular symposia, and assist in the formulation of research projects."

There appears to exist, among people involved in the HCST evaluation process so far, a strongly felt need for some form of organizational and/or support framework. This is especially important, given the many barriers to genuinely interdisciplinary research which will have to be overcome if the HCST field is to develop.

The present notes arise from brief discussion at the September meeting of the Ontario regional group, specifically on the possibility of establishing a learned society in HCST. I have tried to outline some of the advantages, disadvantages, and potential pitfalls of such a society. In so doing I have inevitably been guided by the issues raised during the September meeting, both formally and informally. No doubt others will raise questions that I have overlooked.

A Proposal

I try to address here specifically the proposal that a society be established for the study of HCST, the aims of which would be:

(a) to promote and facilitate the development of (most particularly interdisciplinary) studies in HCST;

(b) to provide a forum for the discussion of research results, methodological issues and broader theoretical questions related to HCST;

(c) to facilitate communication among researchers, both within and outside the university-affiliated academic community, working in HCST;

(d) to provide contacts between HCST researchers and people within relevant academic (or non-academic) pursuits not directly involved in studies in HCST.

The society would meet during the annual meetings of the Learned Societies, which rotate among universities across Canada.

Illustrations of how such a society could address the above aims:

(a) by compiling a directory of researchers or resources in the HCST field; by producing a periodical newsletter on developments related to the field;

(b) and (c) through presentations of papers and panel sessions at the annual meeting; through ongoing regional and/or subject-oriented networks; through "new publications of interest" bulletins;

(c) and (d) through joint sessions with learned societies in disciplines meeting at the same time as the HCST organization; through cooperative efforts with groups like the Centre for Investigative Journalism, Canadian Centre for Policy Alternatives, National Action Council for the Status of Women, Canadian Centre for Occupational Health and Safety, etc.

Why a Learned Society?

The concept of an organization committed to studies in HCST may be fine, some will say. But why a learned society? Why not just another organization?

By meeting at the same time and place as existing learned societies, such an organization could achieve an opportunity for contacts with researchers in existing disciplines which it might not otherwise have. The Learned Societies' meetings provide an annual opportunity for such contacts which no other <u>single</u> event currently provides.

A more general advantage of such an organization is that it provides an obvious framework for development of the HCST field. It could, <u>e.g.</u>, apply for SSHRC funds for the development of the field, a kind of grant for which there is already

a precedent. Similarly, the possibility exists of travel funding for attendance at the meetings through SSHRC; at present, unfortunately, eligibility for such funding is restricted to those holding university appointments. Possibly other sources could be tapped for grants to set up a travel funds pool for those outside the academic community; perhaps the SSHRC policy could in time be changed.

Some Disadvantages

Two obvious disadvantages suggest themselves. One is the replication of a narrowly-focussed perspective on the field which many see as a drawback of existing disciplinary perspectives, complete with orthodox methodologies, obligatory authors and (in time) its very own pantheon of *savants*.

The very notion of a "learned society" will be seen by some as a contribution to such ossification. It is a debatable point whether this is more characteristic of this than of any other organizational format. I would argue that if *any* format is to escape this fate (which is has to do if the HCST field is to realize its true significance), it will have more to do with the dynamism, commitment and imagination of the people involved than whether it's called a learned society or something else.

A second, and related, danger is that such a society will exclude (intentionally or otherwise) people outside the academic community. It seems to have been a broad consensus in group meetings so far that one of the most exciting aspects of HCST was the potential for involving researchers outside the normal academic channels and/or constituencies systematically under-represented in access to research priorities and research results. If any HCST organization were to ignore this imperative, its value would be seriously limited.

The concept of a learned or technical society with a large membership outside the academic community is not a new one, however. The 1979 membership directory of the International Association of Energy Economists lists university affiliations for only 13% of its approximately 1200 members. I have unfortunately mislaid my 1980 membership list for the Committee on Socialist Studies; the 1979 list gives university addresses for less than half of the Committee's 300-plus members. The Solar Energy Society of Canada, Inc. (SESCI), concerned with both technical and policy issues, is another example.

I would argue that if the people involved with such an organization are committed to involving interests and organizations outside universities, an imaginative pursuit of this objective will more than make up for the disadvantages of style that accompany the format of a learned society.

The Importance of Regional Concerns

Particular regional needs in the development of studies in HCST have frequently been cited. It is extremely important that any organization of the kind proposed be able to respond

to these needs. One avenue is through the organization of regional chapters or divisions. All three of the organizations mentioned above have such divisions; I do not know how well the members of IAEE, COSS and SESCI are satisfied with the operation of the chapters in this respect.

The maintenance of continuing networks of researchers in HCST could probably be accomplished more readily on a regional than on a national basis. Regional meetings could provide a forum for communication among researchers, and could also provide at least a partial remedy for the problems posed by the high cost of travel to national meetings.

(This last problem, of course, will be with any national HCST organization, whether it calls itself "learned" or not.)

Some (ugh!) Practical Considerations

Any such organization would initially need "seed money" to establish itself. SESCI, for instance, obtained a federal grant of $30,000 in the first year of its existence, $20,000 in its second, and $10,000 in the third (and subsequent) years.

Funds could also be raised through membership fees, but the potential here should not be overestimated. Assuming 300 members at an average cost of $20/year (to encourage membership from outside academe, membership could be put on a sliding scale which varies with income, as is the case with the Canadian Political Science Association) yields a total of just $6000/yr--less, of course, the costs of soliciting and collecting these funds.

Members, justifiably, expect to get something in return for their membership besides a warm feeling. Since a newsletter for people working in HCST has often been suggested, this is an obvious start. If it is decided that (a) an HCST organization of some sort and (b) a newsletter are both desirable, it would seem unwise not to have the HCST organization produce the newsletter!

Again, it seems probable that some seed funding would be required apart from a specific grant for production of a newsletter or resource directory. It is possible to keep such an organization going for long periods of time on a largely-volunteer basis, but my experience has been that it tends to produce distortions in the form of the organization (not to speak of distortions in the lives of the volunteers).

People involved with the organization on a voluntary basis (and there would have to be many) should, still, be committed thoroughly to the objectives of the organization and to the development of the HCST field.

A further problem which would have to be addressed very early on is how to communicate the existence of the society to those people outside normal academic channels who should have access to it.

A Concluding Caveat

These notes are preliminary in nature, based on (a) a conviction that an HCST society is an extremely good idea and (b) a bit of experience with voluntary organizations of various kinds.

If the national group were to decide that establishing such an organization is important, I suggest that it would be worthwhile to undertake a somewhat more detailed and extensive study of some existing organizations at least partially analogous.

Setting up such an organization is a critically important task, and it would be well to have as much information about previous experience available as possible.

Canada